Report 10300-12
September 1994

Earth Observing System (EOS)/ Advanced Microwave Sounding Unit-A (AMSU-A) Monthly Report for August 1994

Contract No: NAS5-32314

CDRL 529: (Including CDRL 203, 204, and 503)

Submitted to:

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Section 1

INTRODUCTION

This is the twentieth monthly report for the Earth Observing System/Advanced Microwave Sounding Unit-A (EOS/AMSU-A), Contract NAS5-32314, and covers the period from 1 August 1994 through 31 August 1994. This period is the eighth month of the Implementation Phase which provides for the design, fabrication, assembly, and test of the first EOS/AMSU-A, the Protoflight Model. During this period the number one priority for the program continued to be the issuance of Requests for Quotations (RFQ) to suppliers and the procurement of the long-lead receiver components. Significant effort was also dedicated to preparation and conduct of internal design reviews and preparation for the PDR scheduled in September.

An overview of the program status, including key events, action items, and documentation submittals, is provided in Section 2 of this report. The Program Manager's "Priority Issues" are defined in Section 3. Sections 4 through 7 provide detailed progress reports for the Systems Engineering effort, each Subsystem, Performance Assurance, and Configuration/Data Management. Contractual matters are discussed in Section 8.

Section 2

GENERAL STATUS OF EOS/AMSU-A PROGRAM

This section presents an overview of the accomplishments and status of the EOS/AMSU-A program as of the end of August 1994 and includes four sections: (1) Key Accomplishments, (2) Overall Status, (3) Action Item Status, and (4) Documentation (CDRL) Status.

2.1 *Key Accomplishments*

Key accomplishments during this report period included:

Specifications and Statements of Work (SOW) For Long-Lead Components

Vendor conferences were held with:

Litton	-VCGDO
	-DRO
FEI	-TCXO (crystal oscillator)
PHONON	-SAW filter

Comments from these vendors are being evaluated for update of the specifications and statements of work prior to the issuance of the requests for quotations (RFQ).

A2 Reflector

The RFQ for the A2 reflector was issued this month to three vendors, Composite Optics (COI), Programmed Composites (PCI), and Texas Instruments.

Command and Data Handling

The Command and Data Handling (C&DH) breadboard testing has continued. Hardware check-out is complete and firmware coding/check-out is nearly completed.

Phase-Lock Oscillator (PLO)

Analysis of the PLO is continuing for electrical radiation hardness, thermal, mechanical/structural, and EMI/EMC. The VCGDO envelope drawing and updated specification have been signed-off and are ready for interim release for RFQ purposes.

Mechanical and Thermal

A1 and A2 module mechanical tolerance analyses have been completed.

Both A1 and A2 TRASYS and reduced SINDA thermal models have been completed.

Ground Support Equipment

It has been established that the NOAA/AMSU-A thermal calibration fixture can be modified for EOS, eliminating any need for a new fixture.

Internal Design Reviews

In an effort to maximize the EOS benefit from "Lessons Learned" on NOAA/AMSU-A and other programs, internal design reviews were started this month. The following reviews were completed:

- System Requirements/System Design
- DC-DC Converter
- Structural/Thermal
- Phase Locked Oscillator
- Ground Support Equipment
- Software
- Signal Processor
- Power Distribution
- Command and Data Handling
- Antenna Subsystem

The Receiver Subsystem will be reviewed the first week of September.

2..2 *Overall Status*

Critical path management continues to be utilized on EOS/AMSU-A to control program focus. The critical paths for the program are controlled by procurement of long-lead components. As reported last month, the following critical path components require purchase order placement in October 1994 through December 1994. Each has been annotated with the current procurement status.

1. VCGDO/Harmonic Mixer: Supplier conference complete, specification and SOW updated, RFQ issuance in September.

2. Crystal Oscillators (TCXO): Supplier conference complete, specification update in September, RFQ in October.

3. A2 Reflector: Specification and SOW updated, RFQ out, bids due in September.

4. DC/DC Converters: Delta proposals in, evaluation and selection in September.

5. SAW Filters: Supplier conference complete, specification update in September, RFQ in October.

6. DRO (Stable Oscillators): Supplier conference complete, specification update in September, RFQ in September.

A summary assessment of the schedule status of the key tasks is presented in Table I. As indicated, the overall status shows improved schedule performance. All of the behind-schedule tasks, including long-lead component specification preparation, will be completed in sufficient time to prevent any overall schedule effect.

Work has progressed on Group II, medium lead, system components during the month. The specifications for the A1 and A2 motors, resolver, and motor bearings have been completed and are in sign-off cycle. The mixer/IF amplifier specification has been reviewed by the vendor and comments are being evaluated.

Table I Key Tasks - Schedule Status Overview

Key Tasks	Schedule Status			Comments
	Behind	On	Ahead	
	-45%	-15%	+15%	+45%
Long-Lead Component Specifications and SOW		X		Key Receiver/PLO vendor conferences held.
Command and Data Handling		X		Breadboard hardware testing completed.
Software (Includes Firmware)		X		C&DH firmware being tested in breadboard.
DC/DC Converter		X		Delta proposals received.
Mechanical Design		X		Back on track for PDR.
Ground Support Equipment		X		VCGDO and TCXO supplier conference held.
Ground Support Equipment		X		Preliminary design on schedule for all GSE.

The EOS/AMSU-A Protoflight Master Schedule is shown in Figure 1. A copy of the design phase detailed schedules is presented in Appendix A.

2.3 *Action Item Status*

This section presents a summary of all action items that existed during this report period.

Copies of responses to all Aerojet action items submitted during this month are presented in Appendix B.

NASA action items from the 4, 5 May 1994 DCR are summarized in Table II.

Aerojet action items from the July 26, 27 Quarterly Review and July 27 Spacecraft Interface Meeting are presented in Table III. Twenty-six of thirty-five items have been completed.

NASA action items from the July 26, 27 meetings are summarized in Table IV.

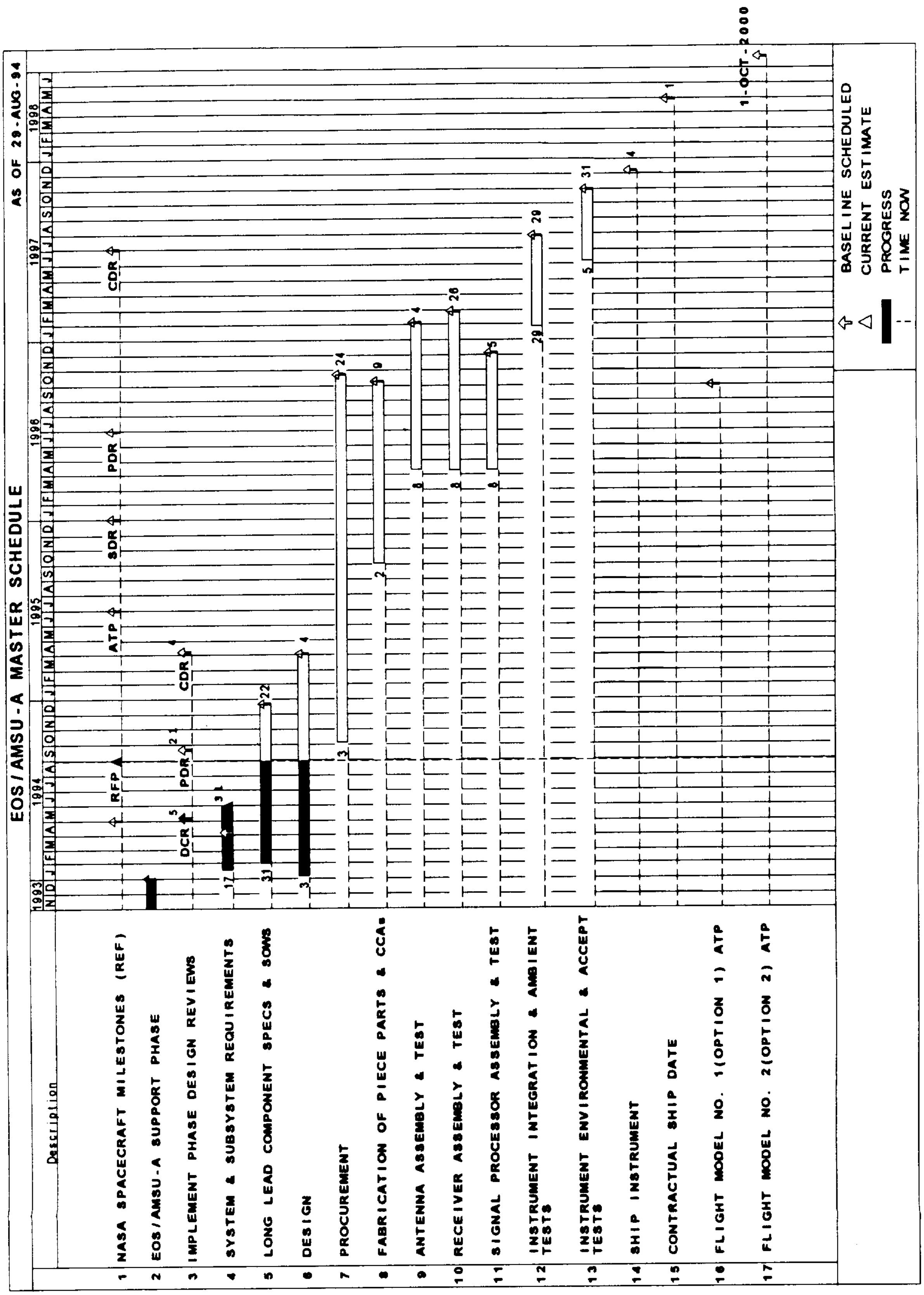


Figure 1 EOS/AMSU-A Master Schedule

Table II Action Item Log - NASA
Design Concept Review of 4, 5 May '94

Action Item No.	Description	Responsibility	Due Date	Disposition Date Ref. Doc.
5/5-20	1. Define Instrument offset Requirements. 2. Who implements? Instrument or Spacecraft?	NASA, EOS Project and JPL	6/15/94	June '94 In revised IDD (change 01)
5/5-21	Provide sample manufacturing Plan.	1. NASA will provide sample plan. 2. Aerojet is submitting Draft Plan at PDR, Final at CDR (submittals under CDRL 023 of existing contract). Will review sample plan and incorporate as required. Inputs are appreciated.	5/27/94	Faxed to D. Howell on 5/12/94
5/5-22	Review PAR Thermal Vacuum Testing Requirements and Aerojet Test Concepts.	NASA, EOS Project	6/15/94	7/17/94 NASA memo R. Shelly to M. Domen, copy Faxed to D. Howell, Aerojet
5/5-23	Provide Bandwidth for CEO 1/EO3 (Para. 10.11.1 of GIRD)	NASA, EOS Project	6/15/94	
5/5-24	Review STE Modification/Utilization Low Plan for EOS/NOAA Conflicts.	NASA, EOS Project	6/15/94	6/6/94 To be addressed as part of EOS/NOAA Contract merger.
5/5-25	Clarify GIRD Requirements Regarding "Science Data, Diagnostic Data, and Engineering Data". What Data goes in each category?	NASA, EOS Project	6/15/94	Will review Aerojet A1 5/5-10 response

Table IIIa Action Item Log - Aerojet
Quarterly Review and Spacecraft Interface Meeting of 26 & 27 July 1994

ACTION ITEM NO.	DESCRIPTION	RESPONSIBILITY	DUE DATE	DISPOSITION DATE, REF. DOC.
7/26-1	Spacecraft System Concept Review is planned for end of 1995. Aerojet should aim to start working ICD issues with spacecraft contractor starting two months after the scheduled award date of July '95. Final ICDs should be available at the SCR. Put this in ARTEMIS/PMS planning.	Don Howell/ Weldon Chapman	8/16/94	8/16/94 with Weekly Report
7/26-2	Schedule status "behind/ahead" (page 20). What is the metric for being within "on schedule". Define the metric.	Don Howell	9/1/94	8/3/94 in Weekly Report
7/26-3	System engineering schedule status (page 33). Add updates to ICD plan to post-PDR, post-CDR (if required) and the August- December '95 time frame for coordination with the spacecraft contractor (see A1 7/26-1) above).	Weldon Chapman	9/1/94	8/16/94 with Weekly Report
7/26-4	Provide data for COI bond line stress levels for launch loads.	Wayne Ely/ Steve Sherman	8/31/94	8/30/94 with Weekly Report
7/26-5	A2 reflector - Determine practicality of making engineering model of composite reflector (if selected) upgradable to a flight model.	Dennis Brest/ Steve Sherman	9/21/94	
7/26-6	Provide NASA with the date when we need inputs regarding the choice of the A2 reflector material (composites vs Beryllium).	Don Howell	8/2/94	8/1/94 Faxed to P. Pecori
7/26-7	Provide NASA a copy of the A2 reflector specification including specification drawing	Dennis Brest/ Don Howell	8/10/94	8/9/94 AI Response to Fed-X to T.O.
7/26-8	Look at efficacy of spending money on emissivity studies/discuss with project (calibration accuracy study, page 63)	Don Howell/ Dennis Brest	8/3/94	8/3/94 in Weekly Report
7/26-9	Hold conference call between Jim Parkinson and Bob Shelley/Mark Domen regarding flowdown of radiation specifications.	Don Howell/ Jim Parkinson	8/31/94 Bob S. on vaca 8/31	
7/26-10	Antenna motor bearings - define what is meant by "bake-out" on page 92.	Weldon Chapman/ Hal Cover	8/10/94	8/10/94 with Weekly Report
7/26-11	Provide a briefing on (l) How we track parts from purchase to "as-built configuration", (2) How we track GIDEP alerts. What are the computerized parts? How long does it take from identifying GIDEP part number to knowing if, and where, it is in our products?	Bob Mehltretter	9/21/94	
7/26-12	Keep Mark Domen informed of Aerojet's potential visits to sub-contractors so NASA may attend meetings as they desire.	Don Howell/ Al Nieto	Continual	
7/26-13	Present the project with a briefing of our DC/DC converter source selection.	Mark Pluck	9/21/94 (PDR)	
7/26-14	Request that when PAR is referenced use the "GSFC-420-05-01, Rev. A dated August 2, 1991". (To assure not referring to NOAA/AMSU-A PAR)	Bob Mehltretter/ PTLs	With issuance of revised PAIP & PDR presentation	

(Continued)

Table IIIa Action Item Log - Aerojet
Quarterly Review and Spacecraft Interface Meeting of 26 & 27 July 1994 (Cont.)

ACTION ITEM NO.	DESCRIPTION	RESPONSIBILITY	DUE DATE	DISPOSITION DATE, REF. DOC.
7/26-15	When stating a material, (coatings, epoxys, etc.) to be used, provide the name or part designation; e.g.; coating ($Si\ O_2$).	Bob Mehltretter/ PTLs	With issuance of revised PAIP & PDR presentation	
7/26-16	Materials lists to be developed. Provide the data as requested by the GSFC-420-05-01 PAR in Figures 6-1C, 6-1D, 6-1E and 6-1F.	Bob Mehltretter	8/21/94 with CDRL 506 submittal	8/17/94 with CDRL 506
7/26-17	When discussing a thermal/vacuum test, state T/V. If we see only thermal listed, we assume NO vacuum.	Don Howell/ PTLs	Concur. Closed.	7/28/94 Concur
7/26-20	Modify CDRL status/tracking table to include a list of all submittals per each CDRL item and the category assigned. (Note: It was agreed Aerojet would provide a copy of their master CDRL schedules, includes all of above information.)	Don Howell	8/3/94	8/3/94 with Weekly Report
7/26-21	Provide list of schedule "Critical" parts and materials ASAP for expediting by GSFC. Submit NSPARs at least 30 days prior to procurement date.	Bob Mehltretter	8/10/94	8/10/94 Faxed to M. Domen, (with Weekly Report of 8/16/94)
7/26-22	Ensure that Parts and Materials Lists submitted to GSFC for approval include Aerojet's and all subcontractors' parts and materials lists.	Bob Mehltretter/ Hal Cover	8/21/94 with CDRL 506	8/17/94 with CDRL 506
7/26-23	Provide rationale for how Chapter 9, Contamination of the EOS Instrument PAR can be met while using a 100K clean room and stated visual inspections. Address why black light inspections and tape samples are not utilized.	Hal Cover	With submittal of CCP due at PDR	
7/26-24	Provide impact assessment of updated NSPARs submittal criteria	Bob Mehltretter/ Emil Lorenz	8/31/94	8/30/94 with Weekly Report

Table IIIb Action Item Log - Aerojet Spacecraft Interface Meeting of 27 July 1994

ACTION ITEM NO.	DESCRIPTION	RESPONSIBILITY	DUE DATE	DISPOSITION DATE, REF. DOC.
7/27-1	What problem does going to 10V (from 8V) to the mixer/IF amp solve? Provide a list of SDARs. What is the supporting data that the problems are resolved?	Young Ma	8/31/94	8/31/94 Faxed to T.O.
7/27-2	Stop work on A1 weight reduction optimization design	Don Howell/ Wayne Ely	7/28/94	7/28/94 Program Directive No. 9
7/27-3	Be sure that bolts used on TIROS spacecraft are specified in the ICD.	Weldon Chapman	8/31/94 (Draft ICD)	8/23/94 with Weekly Report
7/27-4	Should the edge stiffening be implemented on the A2 to raise the natural frequency from 80Hz on the NOAA unit to 90 Hz on the EOS unit? What is trade between having to do additional analysis because we are less than 100 Hz and trying to get to 100 Hz? Include cost to do design change (including all paper and tests) and what is saved in production. Look at weight margin of N&N'.	Wayne Ely	8/31/94	8/30/94 with Weekly Report
7/27-5	What is relationship between linear (mils) shift in antenna motor shaft position and angle change (arc seconds).	Weldon Chapman	9/21/94	
7/27-6	Determine basis for 1553 RT validation plan.	Mark Pluck	8/11/94	8/10/94 with Weekly Report
7/27-7	Define current threshold on A/D convertor dropout.	Mark Pluck	8/31/94	8/10/94 with Weekly Report
7/27-8	See when we can get Gus Wessels, Mike Mitchell (and Don Howell) in the MRP training class.	Don Howell	8/15/94	8/10/94 FTDO Note to G. Wessels
7/27-9	Define what it takes to upgrade the CSTOL workstation to be capable of doing the complete instrument functions at the spacecraft contractors (not just listen only).	Bob Schwantje/ Doug McDonald	8/27/94	8/9/94 with Weekly Report
7/27-10	Review pyroshock and sine burst requirements and applicability to component and instrument.	Weldon Chapman/ Wayne Ely	8/27/94	8/16/94 with Weekly Report
7/27-11	Flowdown to suppliers' requirement for N_2 atmosphere during thermal cycling tests.	Weldon Chapman	8/27/94	8/30/94 with Weekly Report
7/27-12	Develop and maintain a list of differences between N/N' and EOS; e.g., components, major active devices, etc. Pete Pecori would like the first cut in about two weeks.	Weldon Chapman	8/11/94	8/9/94 with Weekly Report

Table IV Action Item Log - NASA
Quarterly Review & Spacecraft Interface Meeting of 26 & 27 July 1994

ACTION ITEM NO.	DESCRIPTION	RESPONSIBILITY	DUE DATE	DISPOSITION DATE, REF. DOC.
7/26-N1	Provide Apiezon-C vacuum/bake-out data from Goddard tests prior to PDR if possible.	Mark Domen/ Bob Shelley	8/21/94	Tests in process as of 9/12/94
7/26-N2	Advise Aerojet regarding the acceptability of specification changes provided in response to DCR action items.	Mark Domen		9/6/94 Telecon Domen/Howell
7/26-N3	PDR - Advise if the guidelines Aerojet is planning to use for PDR are acceptable.	Mark Domen	8/8/94 if not OK	8/8/94 Telecon: OK
7/27-N1	Provide a letter summarizing the recommendations and GIRD clarification resolved in the C&DH splinter meeting. Include clarification of how data is to be handled when request for data is not received from the spacecraft.	Mark Domen/ Pete O'Neill	8/21/94	9/6/94 Telecon Domen/Howell Ltr to follow
7/27-N2	Review the acceptability of 3°C/minute temperature change for component testing.	Bob Shelley	8/11/94	9/6/94 Telecon Domen/Howell
7/27-N3	Review the number of T/V and thermal cycles required.	Bob Shelley	8/11/94	9/6/94 Telecon Domen/Howell

2.4 *Data Delivery*

The Contract Data Requirement List (CDRL) items shown in Table V were delivered during this report period.

Table V EOS/AMSU-A August Documentation Submittals

CDRL	Description	Submitted to NASA
023	Fab/Assy Flow Plan	8/18/94
025	In-Flight Checkout Plan	8/17/94
108	FMEA	8/18/94
203	Configuration Management Status Report (Included in CDRL 529)	8/16/94
204	Performance Assurance Status Report (Included in CDRL 529)	8/16/94
303	Command List & Description	8/10/94
305	Engineering Telemetry Desc	8/12/94
306-2B	Firmware Requirements	8/1/94
308	Performance Verification Spec	8/3/94
309	Software Assurance Plan	8/18/94
403	* DPA Procedures	8/30/94
405	General Oper Command Proc	8/17/94
503	Weight/Power Budgets (Included in CDRL 529)	8/16/94
504	Limited Life Items List	8/18/94
506	Matl List, Lub List/Processes List	8/17/94
507	Critical Items List	8/18/94
521	Weekly Status Report	8/1, 8/9, 8/16, 8/23 & 8/30
523	Performance Measurement Status Report Included in CDRL 534)	8/18/94
527	As-Designed Parts List	9/1/94
529	Reports of Work (Monthly Status Report)	8/16/94
534	Mo./Qrtly. Financial Mgmt. Rpt. (NASA Fm. 533M/533Q)	8/18/94

*Resubmittal based on NASA comments.

Section 3

PRIORITY ISSUES

The Program Manager's current priority issues and concerns are presented in Table VII. The status and plan for each issue is included, together with general comments to assist in understanding the background or plans for each entry.

Table VI Program Priority Issues

Issues/Concerns	Status and Plan	Comments
PLO Configuration - Repackaging PLO to provide an integrated crystal oscillator/PLO package and reduce noise potential is being considered. Since crystal oscillator is a critical path item, issue must be resolved promptly.	Evaluation in process but PDR preparation is interfering. Will present plan at PDR.	Potential major improvement. Long term payoff potential very high.
Assure long-lead item purchase orders get placed on schedule - they control critical paths (Schedule slips cost approximately $250K/month)	Critical paths have been updated. Work has been prioritized in accordance with critical paths.	See PLO item above. Other items moving on schedule for October through December purchase order placement.
Cost containment	Rates have stabilized.	Rates situation may be helped by SADARM success - could increase the direct labor base.
A-2 Module antenna material	Composites selected. Established competitive procurement strategy for composites. RFQs issued.	Potential suppliers preparing proposals. Proposal evaluation team established.
Command and Data Handling interface requirements. We are breadboarding early; must assure requirements are solidified and understood.	Discussion with NASA technical officer 18 August at Aerojet assures good requirements understanding. NASA will provide written confirmation of requirements.	Plan to complete breadboard tests prior to PDR.

Section 4

SYSTEMS ENGINEERING

Primary Systems Engineering activity for August included responses to action items, systems support in the preparation and review of component specifications and statements of work, establishment of guidelines and schedules for internal design reviews, and preparation and presentation of an internal system design review.

An initial draft of the Interface Control Document was completed. Team members have reviewed the document and submitted their comments. Final review of the Radiometric Math Model was completed and the document is being corrected and released for delivery to NASA.

Efforts continued to verify requirements allocation to subsystems and interfaces in support of critical path procurement activities and in preparation for internal design reviews.

Responses to Action Items 7/26-1, -3, -10, and -18 and 7/27-3 and -12 were completed and submitted to GSFC. Copies are provided in Appendix B.

Guidelines for Internal Design Reviews were prepared and provided to Product Team Leaders. Schedules for all internal reviews were then established, beginning with the Systems Internal Design Review.

An internal Systems Design Review was held on Wednesday, 24 August. A list of attendees and a summary of the review and action items are presented in Appendix C.

4.1 *Weight and Power Budgets (CDRL 503)*

Weight and power estimates, shown in Tables VII and VIII have changed since last month to reflect a more accurate estimate of the latest A1 mounting structure and the addition of the previously deleted upper card rack. This rack is not needed to hold circuit cards (which have been deleted) but was found necessary for thermal conduction and to a lesser degree, structural support.

Table VII EOS/AMSU-A WEIGHT BUDGETS AND ESTIMATES

	AMSU-A1		AMSU-A2	
Subassembly	**Budgeted Weight (kg)**	**Estimated Weight (kg)**	**Budgeted Weight (kg)**	**Estimated Weight (kg)**
Antenna	25	22.46	32	29.18
Receiver	16	13.90	4	2.00
Signal Processor	7	6.23	4	3.99
Power Distribution	2	1.59	2	1.59
Miscellaneous	7	4.56	7	3.75
Subtotals	57	48.74	49	40.51
Totals				
Estimated	89.25			
Budgeted	106			
Specification	110			

Table VIII EOS/AMSU-A POWER BUDGETS AND ESTIMATES

Subassembly	AMSU-A1		AMSU-A2	
	Budgeted Power (W)	Estimated Power (W)	Budgeted Power (W)	Estimated Power (W)
Antenna Scan Drive				
Noisy Bus	4	3.1	4	3.2
Quiet Bus	11	9.7	7	5.1
Receiver	36	34.3	5	4.9
Signal Processor	13	12.1	9	7.8
DC/DC Converter	19	18.2	7	5.8
Subtotals	83	77.4	32	26.8
UIID Allocation	88		37	
AMSU-A Totals				
Estimated	104.2			
Budgeted	115			
UIID Allocation	125			

Section 5

SUBSYSTEMS, ASSEMBLIES, AND EQUIPMENT

5.1 *Antenna Subsystem*

Antenna Subsystem Performance Confirmation

The S/N 104 antenna performance data has been tabulated and prepared in graphic form as a means of confirming the subsystem performance of the EOS/AMSU-A antenna design. Beam pointing accuracy data, Figures 2 and 3, show conformance with the EOS requirements for all beam positions and channels. The half power beamwidth data, shown in Figures 4 and 5, show that the beamwidths are within the specification requirement of 3.3 degrees ± 10%. The measured channel-to-channel variance of the average beamwidth, Figure 6 data exceeds the NOAA/AMSU-A requirement of 0.33 degree by 0.17 degree. A plan for mitigating this problem on future instruments is being formulated and will be presented at PDR. Beam efficiency, calculated from measured data, meets or exceeds requirements (≥ 95 percent) for all beam positions and channels.

Cold calibration antenna patterns were measured for the NOAA/AMSU-A S/N 104 instrument and calculations of the percent energy from the Earth during cold calibration were made for both the NOAA orbit and the EOS orbit. The calculations for EOS show that the antenna meets the derived requirement of ≤ 0.70 percent. These data are presented in Figure 7 with a sample antenna pattern showing the sidelobe region which intercepts the Earth.

The motor performance for both the A1 and the A2 motors is shown in Figures 8 through 11 from measured S/N 103 motor data. In all cases the motors pass all specification requirements.

A2 Reflector Procurement Status

Two bidders, Composite Optics Incorporated (COI) and Programmed Composites Incorporated (PCI) have indicated they will respond to the request for proposal from Aerojet. The third vendor, Texas Instruments, has informed us of their "no-bid" decision due to the fixed price development required. Meetings have been set up with both remaining bidders to review the specification and SOW and answer any questions regarding interpretation of the requirements. The meetings will be held on Thursday, September 8 and Monday, September 12.

Motor and Bearing Procurement Status

The antenna product team will visit Vernitron Corporation in September to inspect their facility's readiness to manufacture and assemble space qualified parts and review the hardware specifications.

The bearing drawings have been reviewed for EOS and will be sent to Barden for quote. It is planned to instruct the bearing vendor to drop-ship their parts directly to the cleaning/lubrication vendor eliminating the need for an extra inspection and handling at Aerojet.

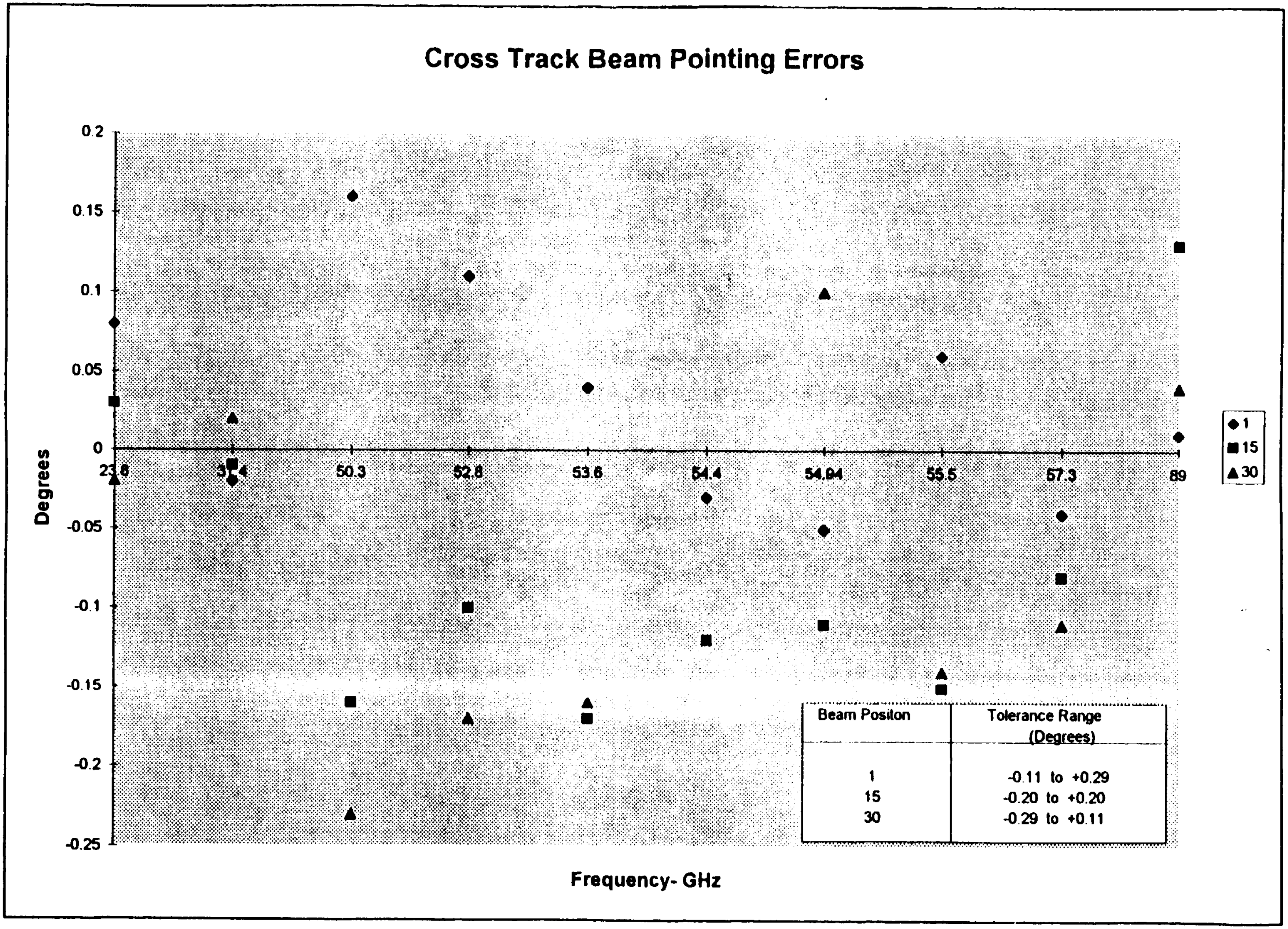


Figure 2 Beam Pointing Accuracy - Cross Track

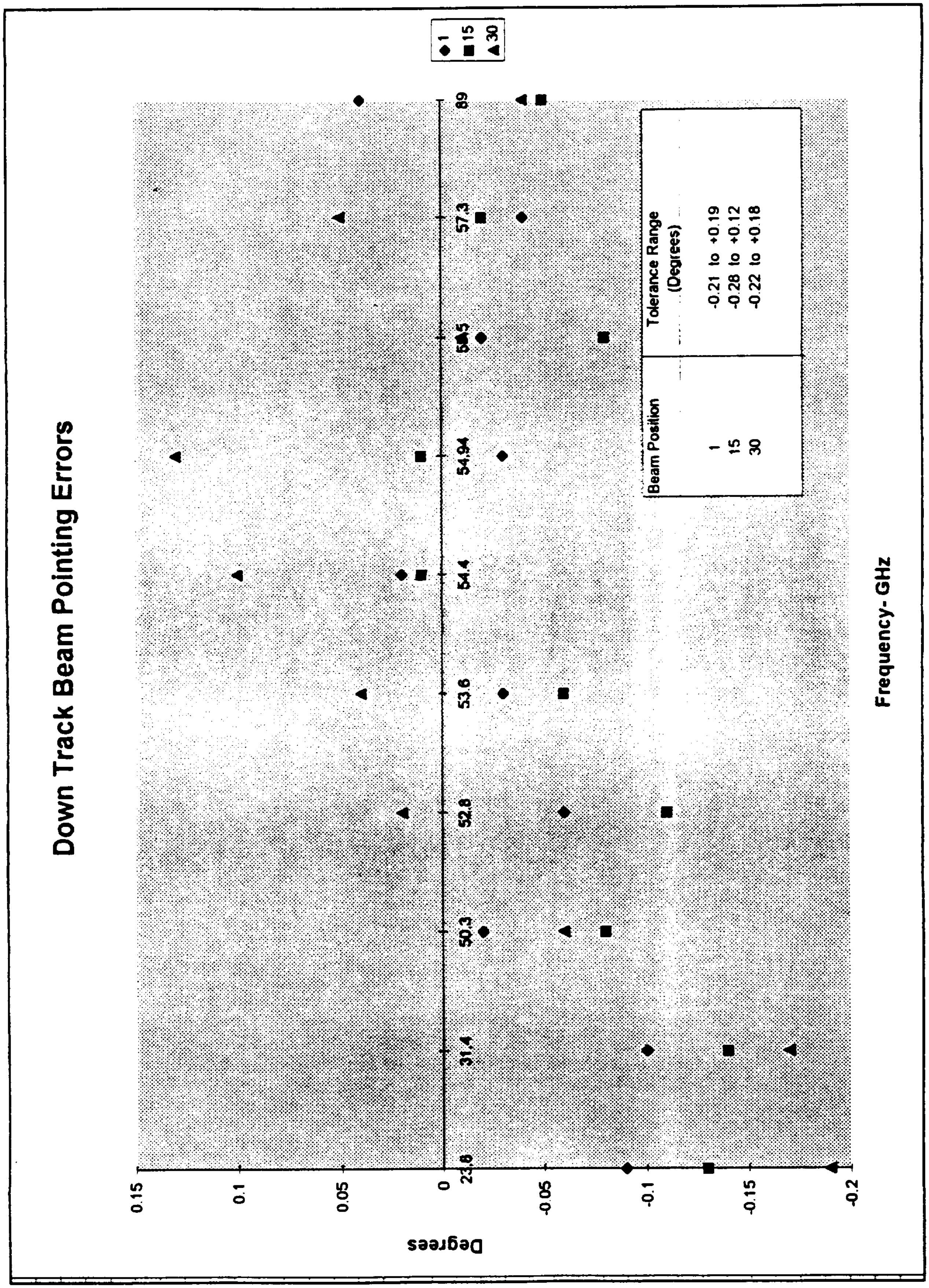


Figure 3 Beam Pointing Accuracy Down Track

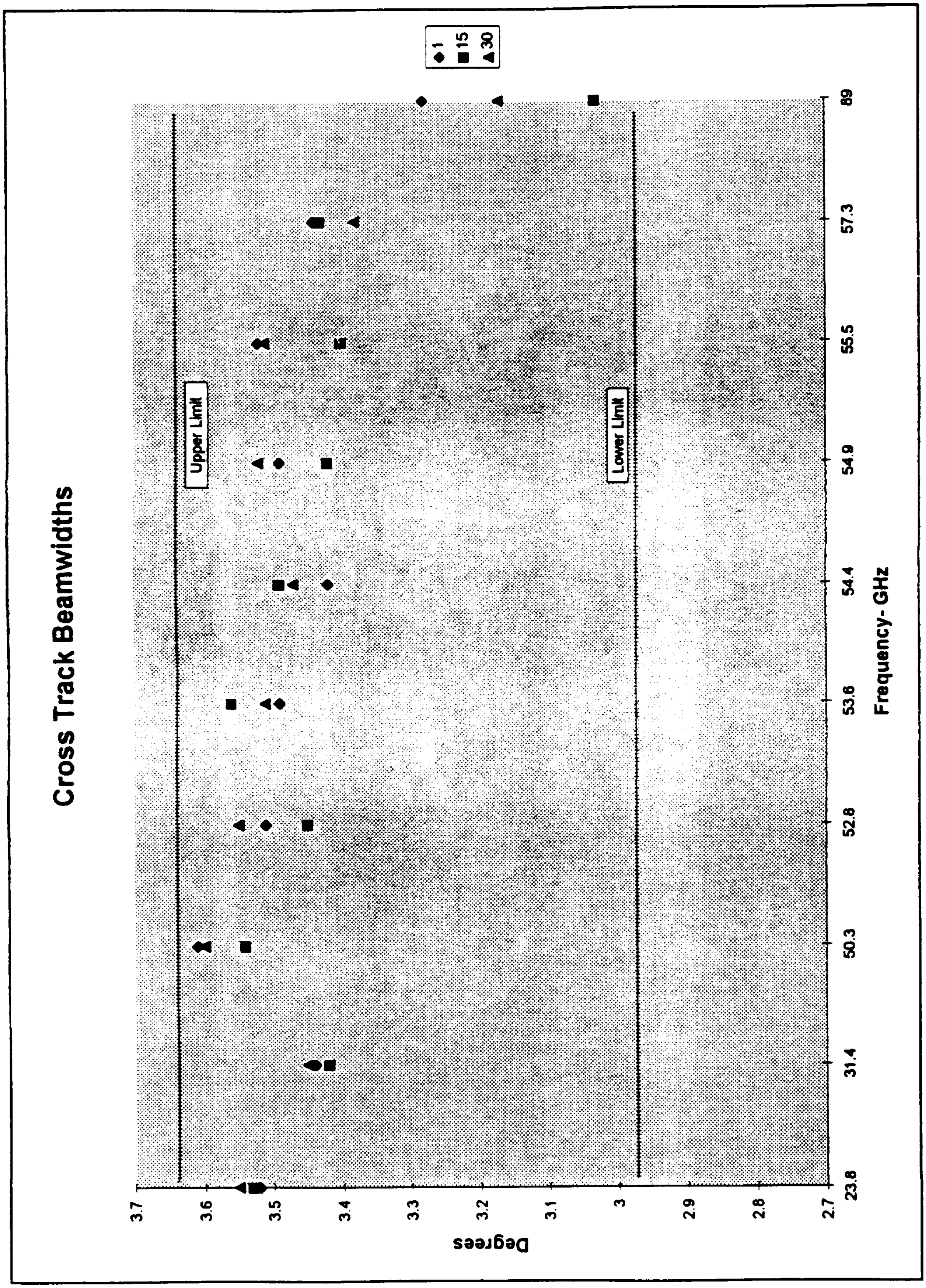


Figure 4 Beamwidth - Cross Track

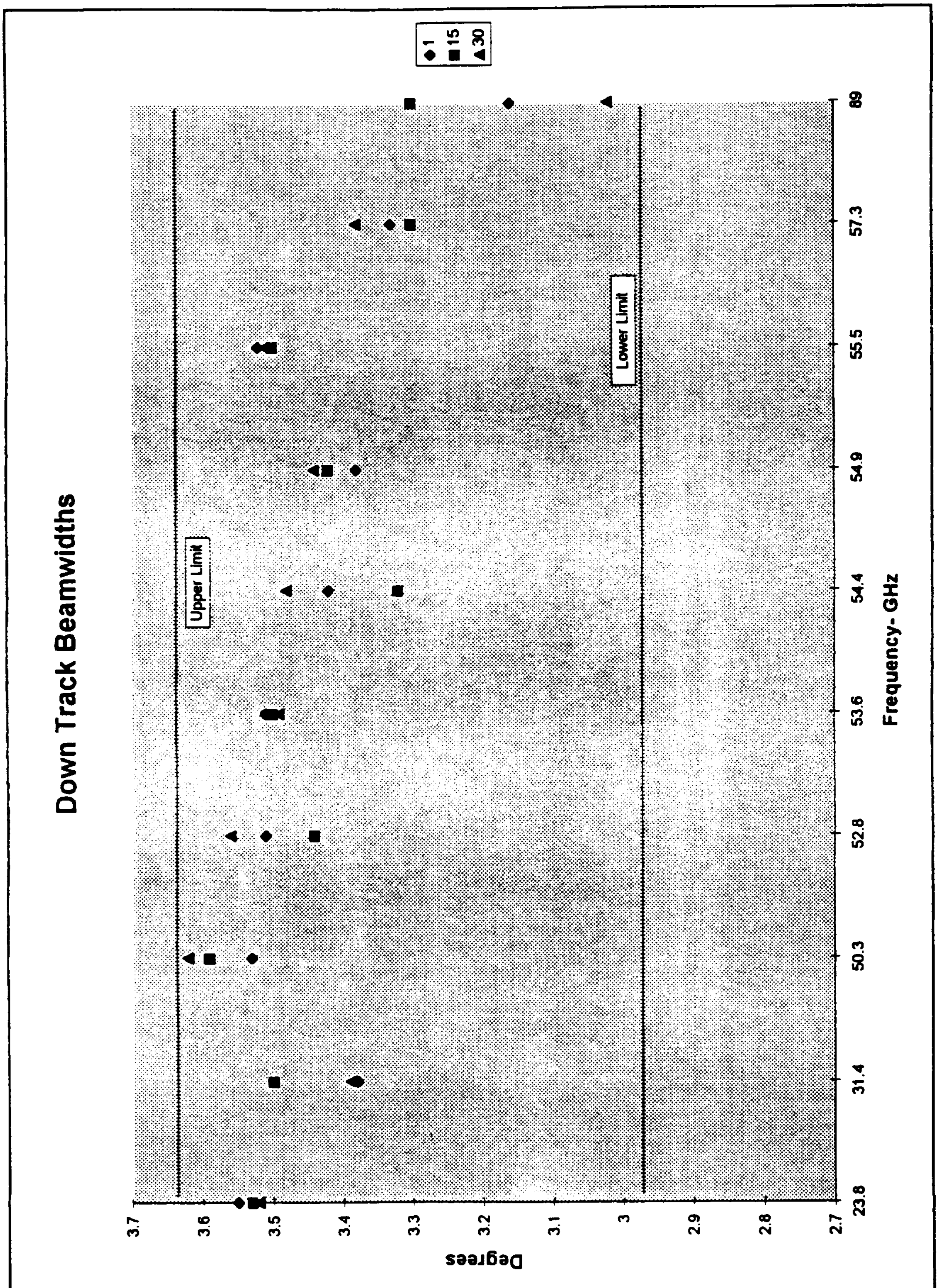


Figure 5 Beamwidth - Down Track

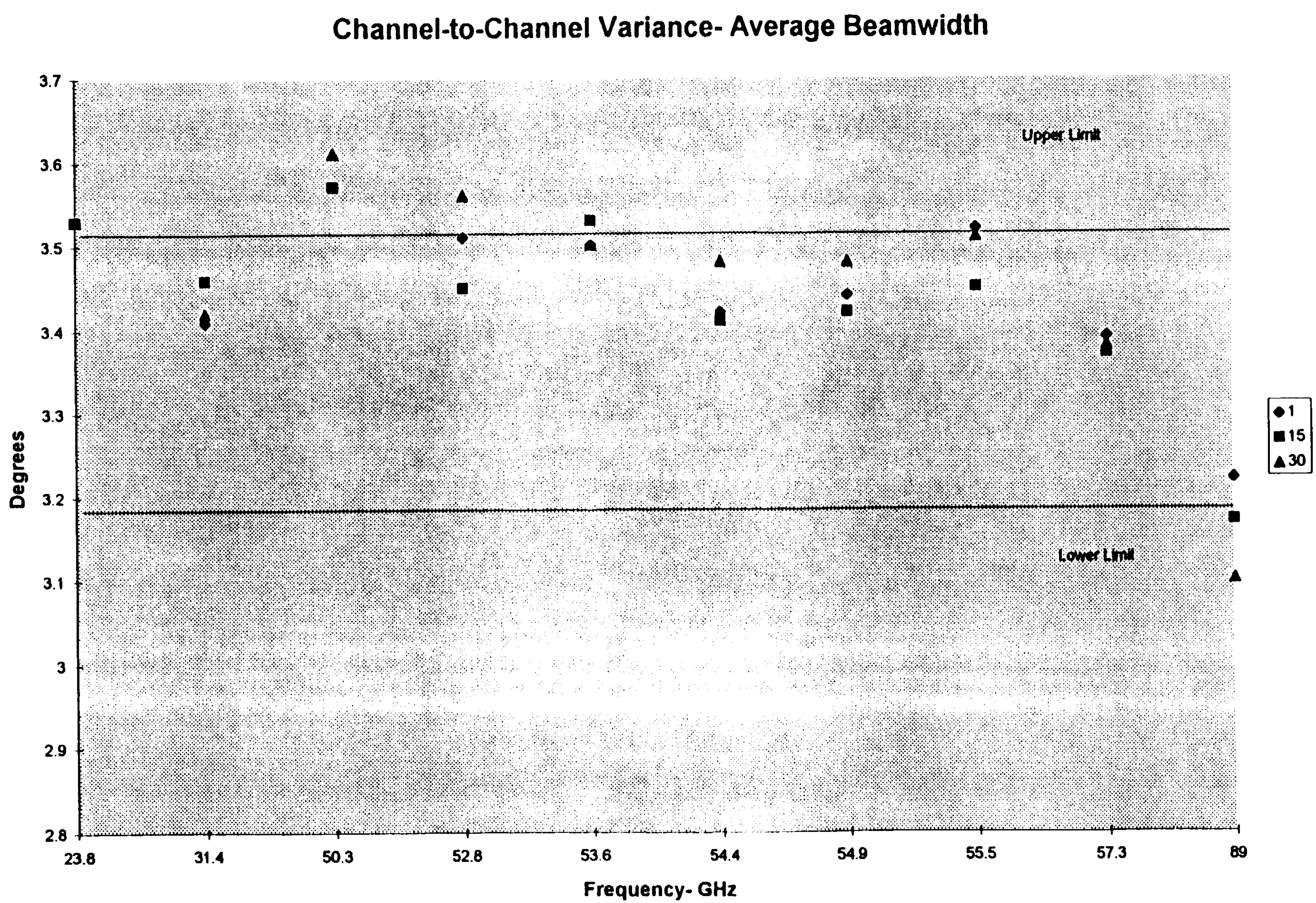


Figure 6 - Beamwidth Variance

Cold Calibration Data (S/N 104)

Frequency (GHz)	Percent Energy Seeing Earth Required	Measured
23.8	≤ 0.70	0.63
31.4	≤ 0.70	0.30
50.3	≤ 0.70	0.57
52.8	≤ 0.70	0.59
53.6	≤ 0.70	0.52
54.4	≤ 0.70	0.63
54.9	≤ 0.70	0.53
55.5	≤ 0.70	0.51
57.3	≤ 0.70	0.60
89.0	≤ 0.70	0.42

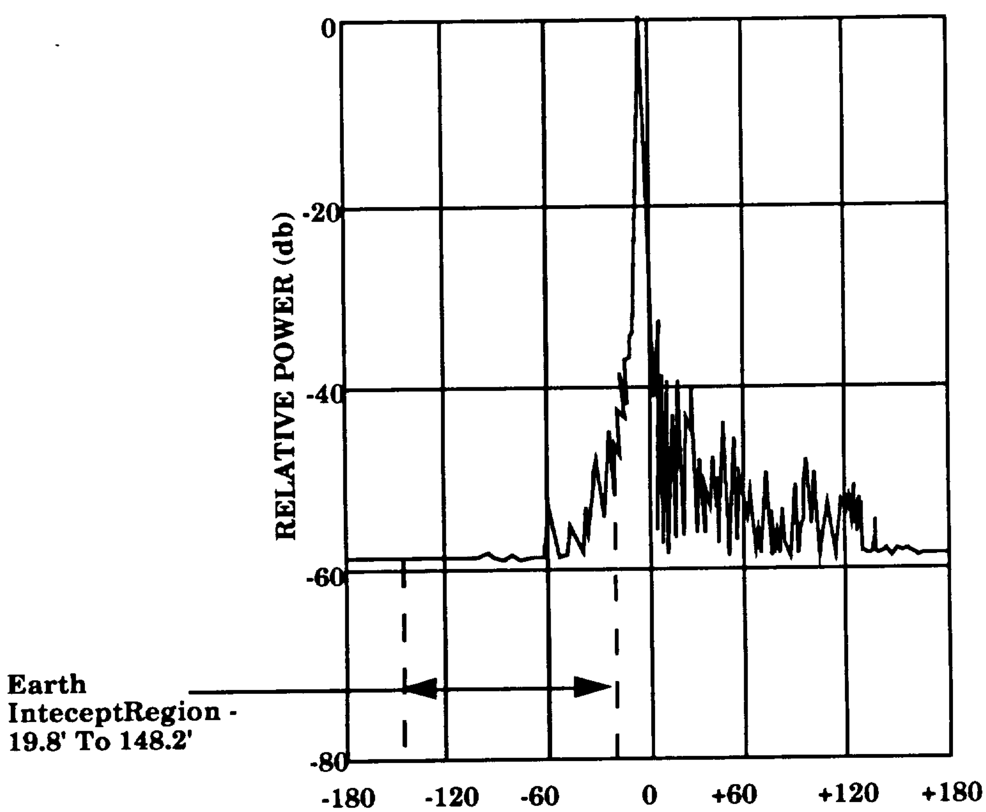


Figure 7 Cold Calibration Data

AMSU-A1 Performance Verification Matrix
S/N 103

Parameter Requirement (specification)	Measured Or Analysis Data	Verification Method				Level				Status
S-480-13 Para. 3.6.3 Antenna Scan Performance		TEST	ANALYSIS	INSPECTION	DESIGN	INSTRUMENT	INTEGRATION	ASSEMBLY	SUBASSEMBLY	
8 second scan period	verified	X				X				comply
Scan synchronization	verified	X			X	X		X		comply
Maximum antenna jitter +10% -5% for 10 msec ± 5% for balance	A1-1 = 7.0% A=1-2 = 7.0%	X X				X X				comply
Sample Period Coincident	coincident 200ms sample period for each channel	X				X				comply
Equal Integration For Scene Calibration Samples	165 ms for A1	X				X				comply

Figure 8 A1 Motor Performance (S/N 103)

AMSU-A1 Performance Verification Matrix
S/N 103

S-480-13 Para. 4.5 Mechanical Requirements

Parameter Requirement (specification)	Measured Or Analysis Data	Verification Method				Level				Status
S-480-13 Para. 4.5.3 Scan Mechanisms		TEST	ANALYSIS	INSPECTION	DESIGN	INSTRUMENT	INTEGRATION	ASSEMBLY	SUBASSEMBLY	
Torque Margin: >3 Times Worst Case Frictional Torque			X						X	comply
Motor Stall Vulnerability No Damage for 30 Min. Under Locked Condition	verified		X					X		comply
Motor Type Brushless	verified			X	X			X		comply
Encoding	verified	X		X		X		X		comply
Stability Margin A1-1: Gain =9.0dB/Phase = 25 Deg	10,00dB/68.8 Deg.	X					X			comply
Stability Margin A1-2: Gain =9.0dB/Phase = 25 Deg	9.24dB/67.6 Deg	X					X			comply
Caging/Deployment Not Desired	verified			X	X	X			X	comply
No Pyrotechnic	verified					X	X			comply

Figure 9 A1 Motor Performance (Continued)

AMSU-A2 Performance Verification Matrix
S/N 103

Parameter Requirement (specification)	Measured Or Analysis Data	Verification Method				Level				Status
S-480-13 Para. 3.6.3 Antenna Scan Performance		TEST	ANALYSIS	INSPECTION	DESIGN	INSTRUMENT	INTEGRATION	ASSEMBLY	SUBASSEMBLY	
8 second scan period	verified*	X				X				comply
Scan synchronization	verified*	X			X	X		X		comply
Maximum antenna jitter +10% -5% for 20 msec ± 5% for balance	9%	X X				X X				comply
Sample Period Coincident	coincident 200ms sample period for each channel	X				X				comply
Equal Integration For Scene Calibration Samples	158 ms	X				X				comply

* Verified per AE-26156/4

Figure 10 A2 Motor Performance (S/N 103)

AMSU-A Performance Verification Matrix
A-2 S/N 103

S-480-13 Para. 4.5 Mechanical Requirements

Parameter Requirement (specification)	Measured Or Analysis Data	Verification Method				Level				Status
S-480-13 Para. 4.5.3 Scan Mechanisms		TEST	ANALYSIS	INSPECTION	DESIGN	INSTRUMENT	INTEGRATION	ASSEMBLY	SUBASSEMBLY	
Torque Margin: >3 Times Worst Case Frictional Torque	>10 times	X	X						X	comply
Motor Stall Vulnerability No Damage for 30 Min. Under Locked Condition	verified		X					X		comply
Motor Type Brushless	verified*			X	X			X		comply
Encoding	verified**	X		X		X		X		comply
Stability Margin A2: Gain =12 dB/Phase = 25 Deg	16.9 dB/81.5 Deg.	X					X			comply
Caging/Deployment Not Desired	verified			X	X	X			X	comply
No Pyrotechnic	verified					X	X			comply

* Verified per AE-26052

** Verified per AE-26156/4

Figure 11 A2 Motor Performance (Continued)

5.2 *Receiver Subsystem*

5.2.1 *General*

Supplier conferences were held for all Group I long-lead receiver components during this reporting period. Litton visited Aerojet on August 2, 1994, to review the interim-release documents for the DRO and VCGDO/harmonic mixers and Aerojet visited Phonon at Simsbury, CT, for the SAW filters, and FEI at Michel Field, NY, for the crystal oscillators on August 16 and 17, 1994, respectively. Several issues and concerns were discussed in the meetings. Per our request, Phonon has conducted a test for the insertion loss variation with temperature on the NOAA/AMSU-A spare SAW filter units to evaluate the extended temperature range required for the EOS/AMSU-A SAW. The measured insertion loss variation of the lower passband was much higher than that of the higher passband (0.84 db vs 0.30 dB for -1 unit and 0.31 dB vs 0.03 dB for -4 unit over the temperature range from 0°C to +40°C). Phonon requested that the specification for insertion loss variation be applied to the average value of the two passbands instead of each passband.

Lessons-learned meetings were held with the NOAA/AMSU-A project and hardware integration team as part of the specifications review for the long-lead receiver components. The NOAA team reported a recent observation that increased system NEΔT was seen when a DRO was operated in parallel with a GDO from a common power supply. The cause of the increase is not clear at this time and is being investigated.

The Product Specification and SOW of the IF amplifiers have been updated and are in review cycle.

Investigation of the DRO noise impact on the system temperature sensitivity has been completed. The DRO shows similar output spectrum characteristics as the GDO (See Figures 12 and 13). The noise figure and noise variance of the mixer measured with the DRO as the LO were comparable of slightly better than those measured with the GDO. This indicates that the NEΔT will not degrade when DROs replace the GDOs that are used in NOAA/AMSU-A instruments for EOS.

Preparation began for the Internal Design Review (IDR) for the receiver subsystem. The IDR is scheduled on September 7, 1994 and will also serve as a dry run for the PDR. Response to Action Item 7/27-1 was completed and submitted.

5.2.2 *Phased-Locked Oscillator (PLO)*

The mechanical drawing package was reviewed during this month, and the resulting redlines are being incorporated into the drawings. The VCGDO/Harmonic Mixer envelope drawing was accelerated through the cycle and has been released to support the procurement of the VCGDO/Harmonic Mixer from Litton Solid State. The PLO electrical drawings are still in the check queue.

The VCGDO/Harmonic Mixer specification was reviewed with Litton Solid State personnel and several useful comments resulted in improvements in the specification. The VCGDO/Harmonic Mixer specification, statement-of-work, and envelope drawing have been signed-off and released and will be given to Litton for formal quotation in September.

The thermal, mechanical, and EMI analyses were completed and are ready for presentation at PDR. The reliability analysis is underway and will be completed by PDR.

Aerojet personnel visited Frequency Electronic Inc. (FEI) to solicit comments and concerns regarding the Crystal Oscillator specification. These inputs are being reviewed and evaluated and may result in modifications to the specification.

A PLO Internal Design Review (IDR) was held during this month. The IDR had two agendas. The first was to expose the PLO design to review from qualified technical areas outside the EOS/AMSU-A program. The second was to gather information and data for the PDR. The IDR resulted in many worthwhile comments that are currently being reviewed and considered. Of particular importance is a suggested repackagng concept which integrates the crystal oscillator within the PLO package, thereby reducing the risk of spurious noise sources affecting systems level performance.

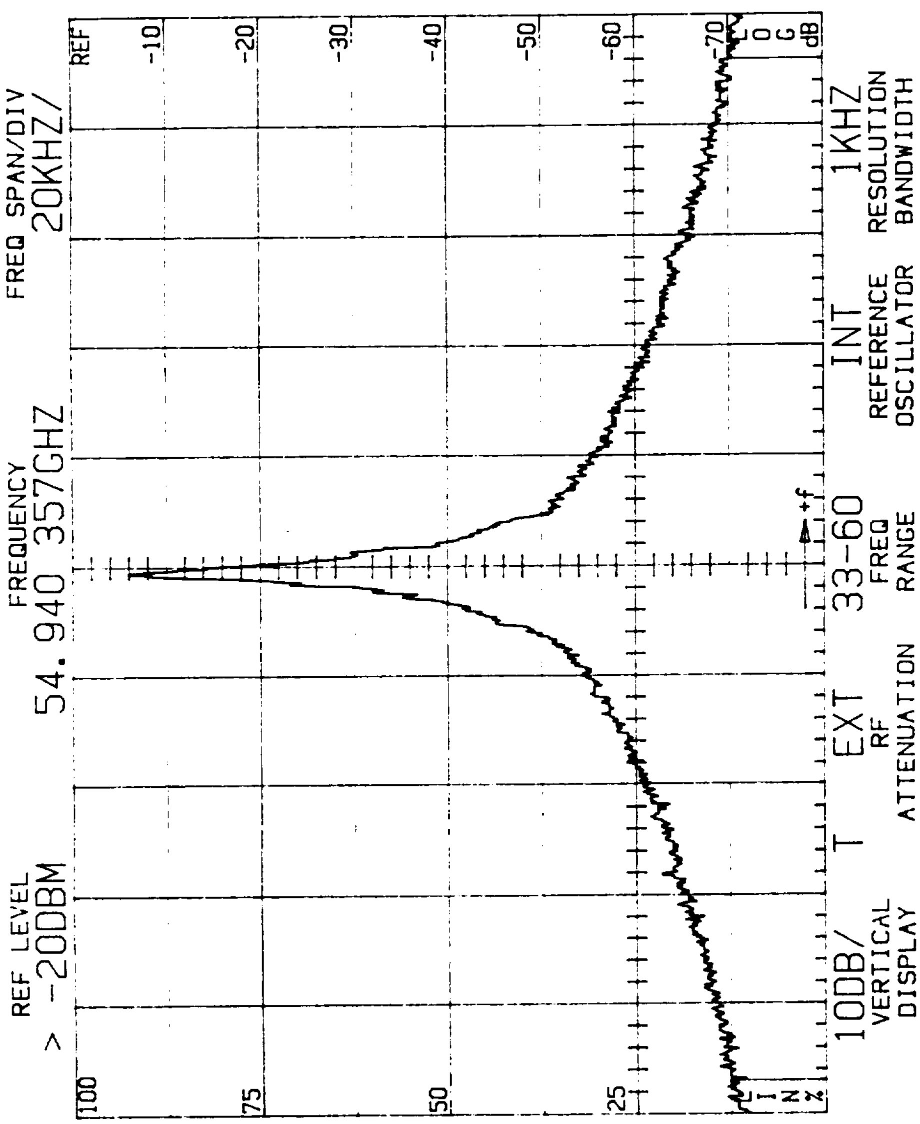


Figure 12 DRO Output

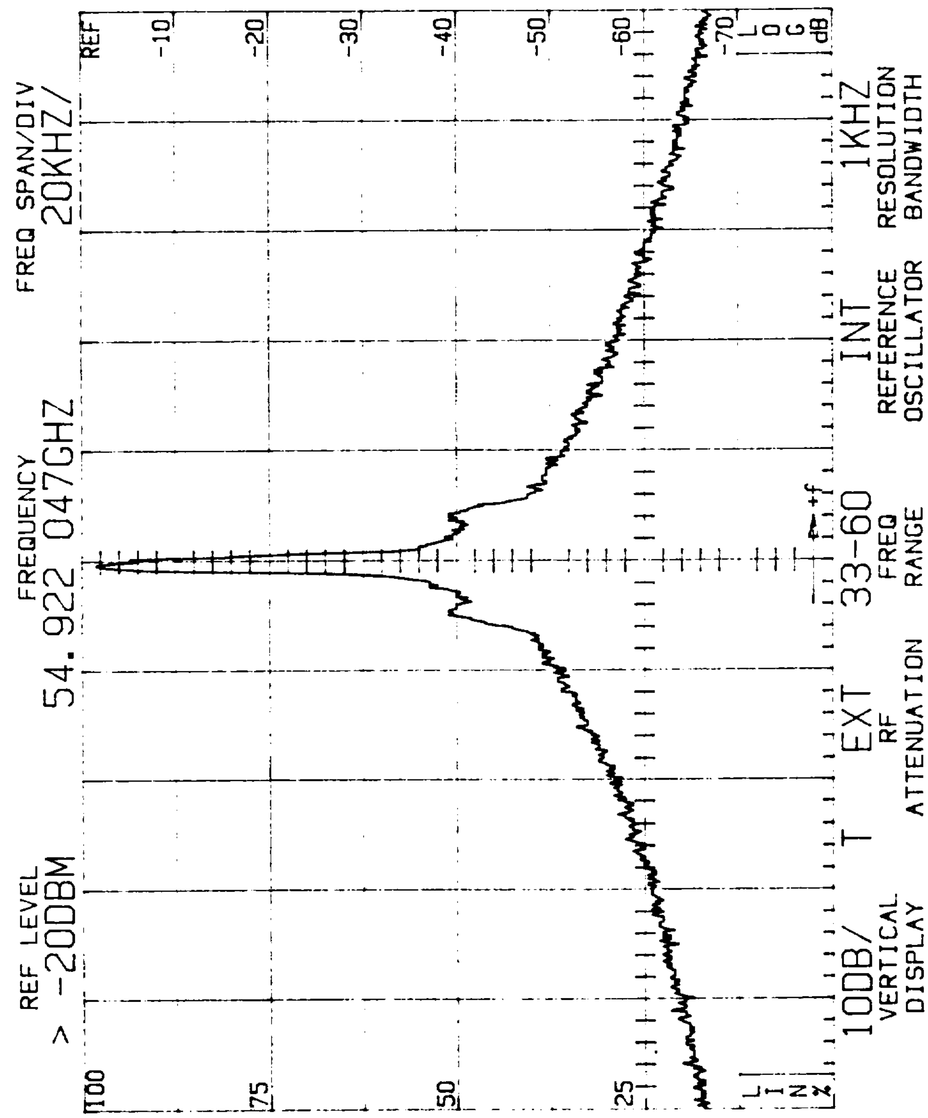


Figure 13 GDO Output

5.3 *Signal Processing Assemblies*

All hardware functions of the MIL-STD-1553 Interface breadboard have been checked out and are operational. The only correction to the design was a change in one wire to avoid an address contention. Interface firmware design was completed and the firmware loaded into the breadboard setup. Integration of the firmware with the hardware is progressing well with no major problems discovered to date. To work around a potential bottleneck in bringing on line the PC/MIL-STD-1553 bus analyzer, a rented standalone bus analyzer has been obtained. Checkout activity towards the end of the month slowed because of IDR and PDR preparation work.

Fabrication of the Signal Processor Test Set is 90 percent complete. This unit will be used as a universal test set for CCA and complete Signal Processor Assemblies.

During the month of August, the Signal Processor Team also supplied extensive assistance in the generation of the following CDRL items:

CDRL 303 - Command List Description Update
CDRL 305 - Engineering Telemetry Description Update
CDRL 405 - General Operational Command Procedure

5.4 *Power Distribution*

An internal Design Review for the DC/DC Converter was held and it was decided to review the receiver power portion after a concern was raised regarding the use of a common power supply for the Local Oscillators. The need for, and impact of, reverting to independent local oscillator supplies is being examined. In the NOAA/AMSU-A instrument these supplies are required to be independently adjustable in order to tune the Gunn Diode Local Oscillators. EOS/AMSU-A uses Dielectric Resonance Oscillators (DROs) which are largely unaffected by supply voltage changes. The EOS/AMSU-A DROs will also include internal voltage regulators and a current foldback feature.

Work on the interconnection system made good progress with the first Engineering cable drawings and wire lists completed. A highly experienced packaging engineer has been brought on board to assist with connector selection and also to handle the interface between the mechanical and electrical aspects of the instrument internal wiring.

5.5 *Mechanical/Thermal Design Analysis*

The Mechanical/Thermal Integrated Product Team (IPT) members reviewed the Action Items from the EOS Quarterly Review held on 27 July. The responses for four Action Items-A1 7/26-4, A1 7/27-4, A1 727-5, and A1 7/27-10, were prepared by IPT. The team recommend that the component sine burst and pyroshock tests be eliminated. This Action Item was completed early to minimize the impact to already released and yet-to-be released component specifications.

The Mechanical/Thermal IPT reviewed work on the A1 Thermal Calibration Fixture and its interaction with the A1 module. The work progressed to the point where it was proven that the NOAA Thermal Calibration Fixture could be modified for EOS use instead of designing and building a brand new fixture.

Later in the month the Mechanical/Thermal IPT meetings concentrated on planning for the Internal Design Review that was held on 30 August. The review was in two sequential parts, Thermal and Mechanical/Structural. Most of the comments from the review team had to do with clarification and amplification of the presentations so that the NOAA/AMSU-A heritage was clear.

Additional technical material will be added to help non-EOS PDR personnel understand the evolution and status of the design.

Three action items were recorded from the review. One requested verification of the highest temperature required in the Motor Specifications versus the temperatures presented. Another requested that Aerojet reduce the potential technical risk from the pyroshock environment by determining the shock-sensitive components and applying an attenuated pyroshock spectrum to those components. The final action was to review the NOAA A2 reflector clamp and determine if a better clamp could be used.

Mechanical tolerance analysis of the A1 module and of the A2 module were completed during the month. The output was used as part of the worst case beam pointing error analysis to be included in the deliverable Worst Case Analysis.

The A2 stress analysis was completed and the Report technical input was submitted to the Technical Publishing group. Work was started on the A2 NASTRAN model description.

Both A1 and A2 TRASYS and reduced SINDA thermal math models were completed. The input for the deliverable Thermal Math Model Report was completed. A single report covered both the A1 and A2 models. Both models were subjected to check cases as required by the GIRD. The 32 degree sun angle (hot case) was run for both models. Conversion cards to change the models from English units to SI units as required by the GIRD were generated.

The PLO structural math model was completed and checked out during the week. Stress analysis using this model was used to determine design margins of PLO.

The mechanical team inputs to the deliverable ICD were integrated into the first draft of the document.

5.6 *Ground Support Equipment*

An Internal Design review for the EOS Instrument Ground Support Equipment (IGSE) was held on August 30. The review encompassed a description of the overall requirements for IGSE contained in various program documents followed by detailed requirements and design approaches for:

1. Handling fixtures
2. Drill templates
3. Manufacturing and protective equipment
4. Shipping containers
5. Calibration test equipment
6. Test fixtures
7. Special test equipment
8. Spacecraft interface workstation

The level of detail in the presentation was aimed at providing an understanding of program requirements for the various elements of the IGSE and a description of the general method whereby the requirements will be met using sketches, simplified block diagrams, and 3-D representations. The information presented was believed to be sufficient to allow the next stage to proceed whereby sheet metal designs, fixture details, wire lists, and cable design drawings could be prepared.

5.7 *Software*

During this reporting month, the coding of the command and data handling firmware was completed and has since been loaded into our microprocessor development system for checkout. A MIL-STD-1553 bus analyzer has been obtained and will be used for firmware testing.

CDRL 033a and 033b have been updated to incorporate NASA comments and will be submitted in early September.

The preliminary test procedure documents, CDRL 415a and 415b, have been drafted and are in review. They will also be submitted in early September.

PERFORMANCE ASSURANCE (CDRL 204)

6.1 *Quality Assurance*

Priority Quality Assurance activity for this month continued to be the review and approval of critical component specifications and statements of work.

6.2 *Design Assurance*

The following documents were completed during the month:

CDRL 506	Materials, Processes, and Lubricants List
CDRL 108	FMEA
CDRL 507	Critical Items List
CDRL 504	Limited Life Items

Section 7

DOCUMENT AND CONFIGURATION/DATA MANAGEMENT

7.1 *Configuration Management*

During this reporting period, there were no Configuration Management activities to report.

7.2 *Document/Data Management*

During this reporting period, Aerojet made sixteen Contract Documentation Requirement Listings (CDRL) submittals as shown in Table IX.

Table IX EOS/AMSU-A August Documentation Submittals

CDRL	Description	Submitted to NASA
023	Fab/Assy Flow Plan	8/18/94
025	In-Flight Checkout Plan	8/17/94
108	FMEA	8/18/94
203	Configuration Management Status Report (Included in CDRL 529)	8/16/94
204	Performance Assurance Status Report (Included in CDRL 529)	8/16/94
303	Command List & Description	8/10/94
305	Engineering Telemetry Desc	8/12/94
306-2B	Firmware Requirements	8/1/94
308	Performance Verification Spec	8/3/94
309	Software Assurance Plan	8/18/94
403	* DPA Procedures	8/30/94
405	General Oper Command Proc	8/17/94
503	Weight/Power Budgets (Included in CDRL 529)	8/16/94
504	Limited Life Items List	8/18/94
506	Matl List, Lub List/Processes List	8/17/94
507	Critical Items List	8/18/94
521	Weekly Status Report	8/1, 8/9, 8/16, 8/23 & 8/30
523	Performance Measurement Status Report Included in CDRL 534)	8/18/94
527	As-Designed Parts List	9/1/94
529	Reports of Work (Monthly Status Report)	8/16/94
534	Mo./Qrtly. Financial Mgmt. Rpt. (NASA Fm. 533M/533Q)	8/18/94

*Resubmittal based on NASA comments.

7.3 Scheduled Submittals

In accordance with the EOS/AMSU-A Master CDRL Schedule, the CDRL items listed in Table X will be submitted to NASA during the months of September and October 1994.

Table X EOS/AMSU-A September/October Documentation Planned Submittals

CDRL	Description	Due to NASA	Submitted to NASA
	September 1994:		
007	Contamination Control Plan	9/21/94	
008	Software Management Plan	9/21/94	*
016	PDR Data Package	9/21/94	
017	Software PDR Data Package	9/20/94	
018	Calibration Management Plan	9/21/94	
033	Software Test Plans:		
	Software Test Plan (Firmware)	9/21/94	9/1/94
	Software Test Plan (GSE)	9/21/94	9/1/94
035	Spares Program Plan	9/21/94	
101	Radiometric Math Model	9/21/94	
102	Structural Math Models:		
	Structural Math Model A1	9/21/94	
	Structural Math Model A2	9/21/94	
103	Thermal Math Models:		
	Thermal Math Model A1	9/21/94	
	Thermal Math Model A2	9/21/94	
106	Hazard Analyses	9/21/94	
113	Stress Analyses Reports:		
	Stress Analyses Report A1	9/21/94	
	Stress Analyses Report A2	9/21/94	
203	Configuration Management Status Report (Included in CDRL 529)	9/15/94	
204	Performance Assurance Status Report (Included in CDRL 529)	9/15/94	
302	Instrument Functional Logic Dia	9/21/94	
306-2A	Spec Test Equip. SW Req.	9/21/94	9/1/94
306-3A	S/W Architecture Design Doc	9/21/94	
402	S/W Standards/Procedures:		
	S/W Dev Process Manual	9/20/94	
	S/W Dev Standards Manual	9/20/94	
	S/W Dev Procedures Manual	9/20/94	
415	S/W Test Procedures:		
	S/W Test Procedure (Firmware)	9/21/94	
	S/W Test Procedure (GSE)	9/21/94	
503	Weight/Power Budgets (Included in CDRL 529)	9/15/94	
508	Acquisition Activities Plan	9/21/94	*
516	Instr. Interface Cont. Doc.	9/21/94	
521	Weekly Status Report	Weekly	
523	Performance Measurement Status Report (Included in CDRL 534)	9/22/94	
529	Reports of Work (Monthly Status Report)	9/15/94	
534	Mo./Qrtly. Financial Mgmt. Rpt. (NASA Fm. 533M/533Q)	9/22/94	
	*No submittal, no changes to CDRL.		

(continued)

Table XI EOS/AMSU-A September/October Documentation Planned Submittals (Cont.)

CDRL	Description		Due to NASA	Submitted to NASA
	October 1994:			
112	112	Worst Case Analysis	10/18/94	
203	203	Configuration Management Status Rpt (Included in CDRL 529)	10/14/94	
204	204	Performance Assurance Status (Included in CDRL 529)	10/14/94	
503	503	Weight/Power Budgets (Included in CDRL 529)	10/14/94	
521	521	Weekly Status Report	Weekly	
523	523	Performance Measurement Status Rpt (Included in CDRL 534)	10/21/94	
529	529	Reports of Work (Monthly Status Report)	10/14/94	
534	534	Mo./Qrtly. Financial Mgmt. Rpt. (NASA Fm. 533M/533Q)	10/21/94	
535	535	Subcontracting Report (Fm. 294)	10/31/94	
536	536	Summary Subcontracting Report (Fm. 295)	10/31/94	
None	None	PAIP (Performance Assurance Implementation Plan)	10/12/94	

Section 8

EOS CONTRACT STATUS

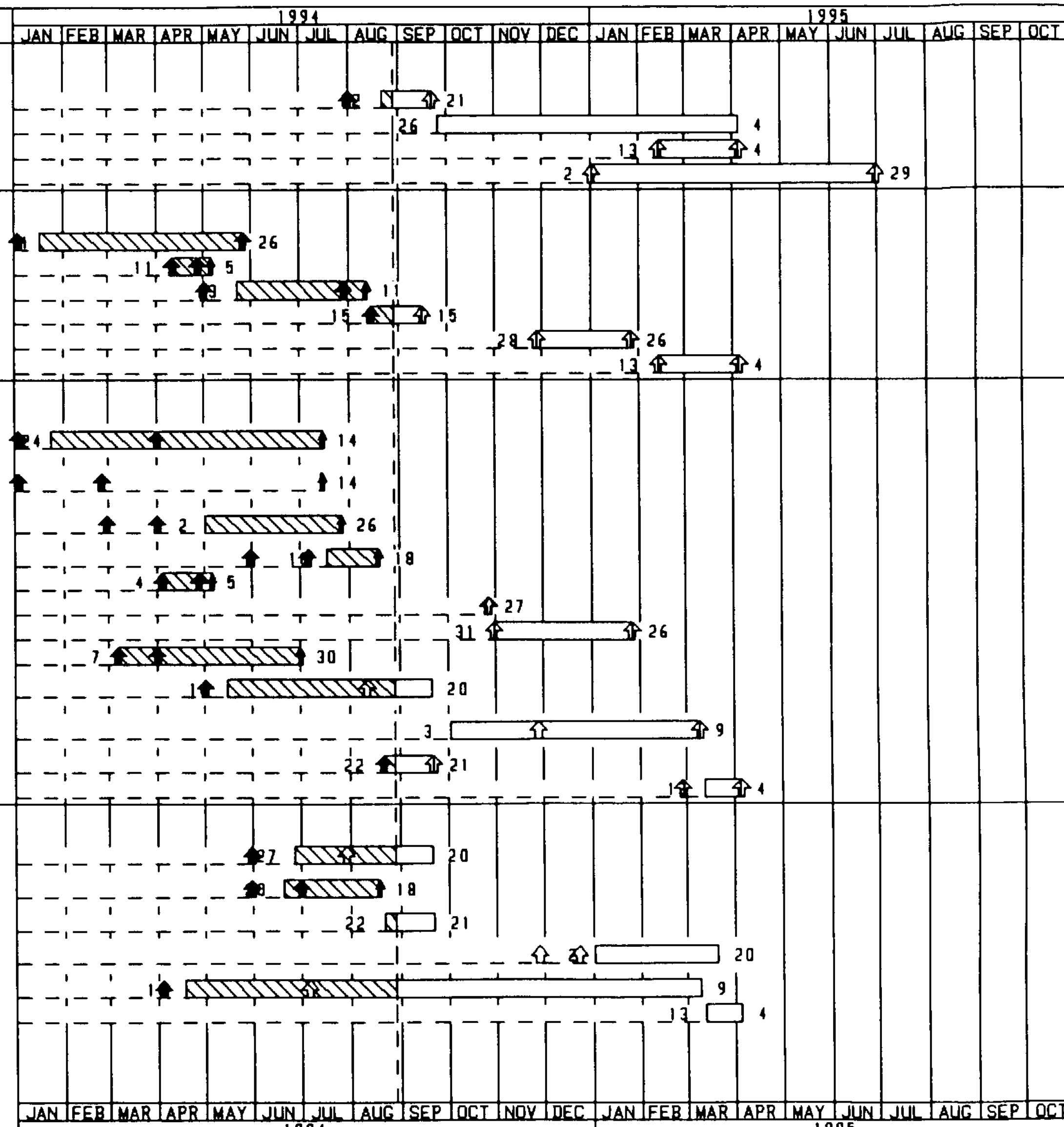
Contract modification six was issued 9 June 1994 and directed Aerojet to incorporate changes to update applicable documents identified in Section J (A-Statement of Work, C - Performance and Operation Specification, E - Contract Documentation Requirements List, G - General Interface Requirements Document, U - Unique Instrument Interface Document), revise the mission life requirement for the EOS AMSU-A instrument, and delete the requirement for a Bench Check Unit (reference Item A1, Clause B.1). Aerojet submitted price proposal C9180-80-02a on 28 July 1994. The proposal is now in the review cycle at GSFC.

APPENDIX A

DESIGN PHASE DETAILED SCHEDULES

Subassembly: EOS RADIATION ANALYSIS (13-2121)   As Of: 29-AUG-94

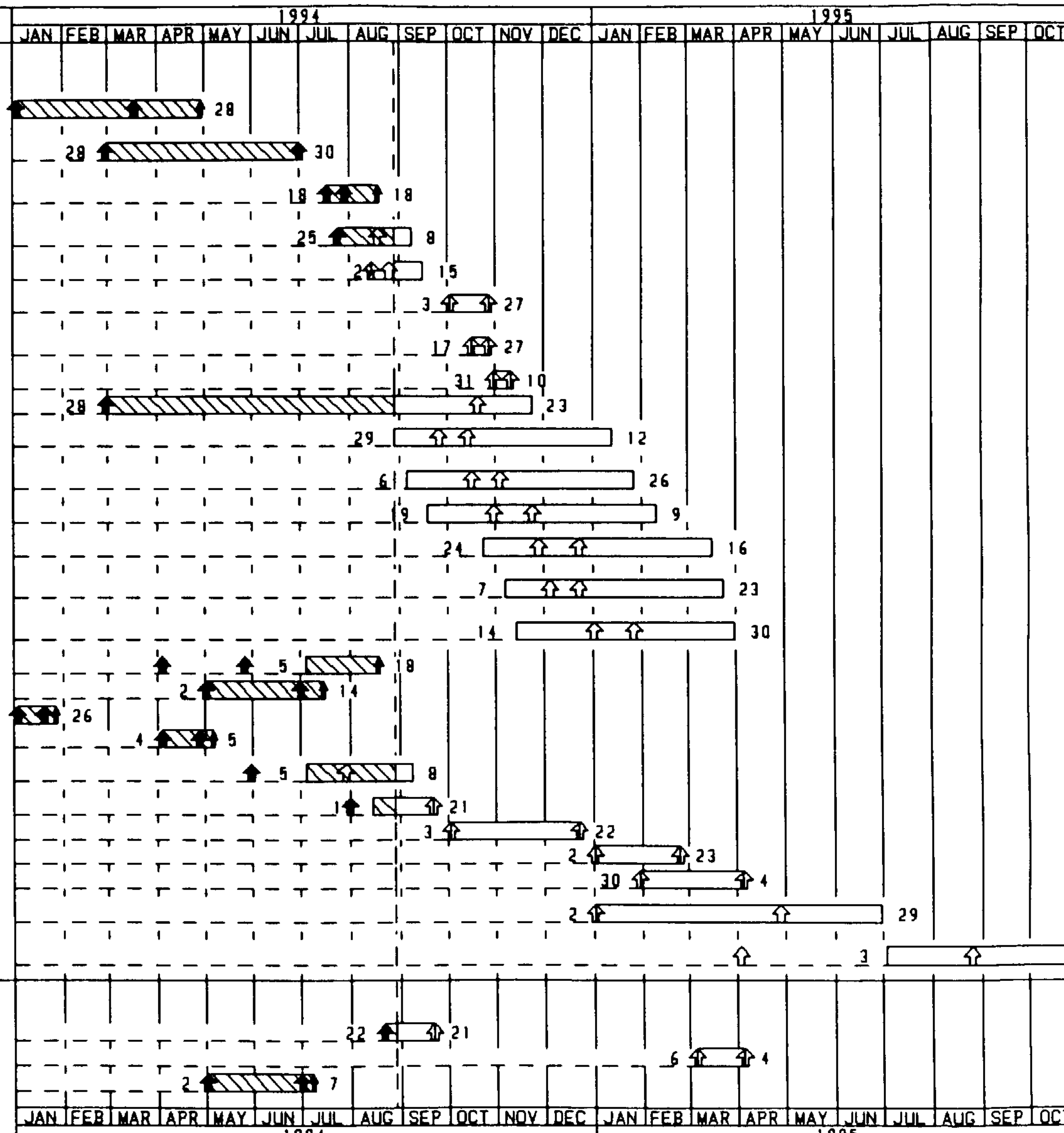
	Activity Code	Activity Description	
		EOS RADIATION ANALYSIS (13-2121)	
57	D1610	PREP FOR & SUPPORT PDR	57
58	D1615	ASSESSMENT UPDATES & DESIGN RECOMMENDATIONS	58
59	D1620	PREP FOR & SUPPORT CDR	59
60	D1650	SUPPLIERS COMPONENT REVIEW	60
		EOS EMI/EMC DESIGN ANALYSIS SUPPORT (65-2122)	
61	D1700	EMI/EMC DESIGN ANALYSIS & SUPPORT	61
62	D1750	PREP FOR & SUPPORT DCR	62
63	D1800	PRELIM EMI/EMC TEST PLAN/PROCEDURE	63
64	D1850	PREP FOR & SUPPORT PDR	64
65	D1900	FINAL EMI/EMC TEST PLAN/PROCEDURE	65
66	D1950	PREP FOR & SUPPORT CDR	66
		EOS CONTAMINATION CONTROL (64-2141)	
67	D2000	PRELIM CONTAMINATION CONTROL CONCEPT/FLOW DIAGRAM	67
68	D2150	TEAM REVIEW OF CONTAMINATION CONTROL/FLOW DIAGRAM	68
69	D2600	CONTAMINATION CONTROL CONCEPT/FLOW DIAGRAM REVIEW WITH NASA	69
70	D2650	FINAL CONTAMINATION CONTROL CONCEPT/FLOW DIAGRAM	70
71	D2750	PREP FOR & SUPPORT DCR	71
72	D2780	NASA CROSS CONTAMINATION INPUTS (SCHEDULE TBD)	72
73	D2800	INSTRUMENT CROSS CONTAM ANALYSIS (SCHEDULE TBD)	73
74	D2850	PREPARE & ISSUE CONTAM CONTROL PLAN - OUTLINE	74
75	D2900	PREPARE & ISSUE CONTAM CONTROL PLAN (CDRL 007) - PRELIM	75
76	D2950	PREPARE & ISSUE CONTAM CONTROL PLAN (CDRL 007) - FINAL	76
77	D3000	PREP FOR & SUPPORT PDR	77
78	D3050	PREP FOR & SUPPORT CDR	78
		EOS MATERIALS & PROCESS ENGINEERING (64-1130)	
79	D2760	REVIEW EXISTING DRAWINGS	79
80	D3060	PRELIM REVIEW & UPDATE OF MATERIALS, PROCESSES & LUBRICANT LIST - CDRL 506	80
81	D3063	PREP FOR & SUPPORT PDR	81
82	D3065	FINAL REVIEW & UPDATE OF MATERIALS, PROCESSES & LUBRICANT LIST - CDRL 506	82
83	D3075	SUPPORT SUBCONTRACTOR SPEC REVIEWS & UPDATES	83
84	D3080	PREP FOR & SUPPORT CDR	84



LRE Schedule	Critical Activity	◊ ♦ 1 Day Open/Complete	1 Day *CRITICAL*	Baseline Dates	EOS
Orig. Sched. Accompl'd	ID:202 Network:EDS	SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M'	ORD: F2/12 AN	Actual - Planned	

Subassembly: EOS RECEIVER SUBSYSTEM (86-2210)   As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS RECEIVER SUBSYSTEM (86-2210)	
85	D3100	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWN TO REC SUBSYS	85
86	D3110	LONG LEAD COMPONENTS (GROUP 1) - DROs, PLOs, SAW FILTERS - DRAFT SPECS& SOWs	86
87	D3120	LONG LEAD COMPONENTS (GROUP 1) - SUPPLIER CONFERENCES	87
88	D3125	LONG LEAD COMPONENTS (GROUP 1) - UPDATE SPECS & SOWs	88
89	D3130	LONG LEAD COMPONENTS (GROUP 1) - RELEASE RFPs	89
90	D3140	LONG LEAD COMPONENTS (GROUP 1) - REVIEW PROPOSALS	90
91	D3150	LONG LEAD COMPONENTS (GROUP 1) - PRE-AWARD AUDITS	91
92	D3160	LONG LEAD COMPONENTS (GROUP 1) - AWARD CONTRACTS	92
93	D3200	MEDIUM LEAD COMPONENTS (GROUP 2) - DRAFT SPECSs	93
94	D3210	MEDIUM LEAD COMPONENTS (GROUP 2) - SUPPLIER CONFERENCES	94
95	D3215	MEDIUM LEAD COMPONENTS (GROUP 2) - UPDATE SPECS & SOWS AS REQUIRED	95
96	D3220	MEDIUM LEAD COMPONENTS (GROUP 2) - RELEASE RFPs	96
97	D3230	MEDIUM LEAD COMPONENTS (GROUP 2) - REVIEW PROPOSALS	97
98	D3240	MEDIUM LEAD COMPONENTS (GROUP 2) - PRE-AWARD AUDITS	98
99	D3250	MEDIUM LEAD COMPONENTS (GROUP 2) - AWARD CONTRACTS	99
100	D3300	INVESTIGATE LO NOISE IMPACT ON SYSTEM NE DELTA T	100
101	D3350	INVESTIGATE MIXER/IF AMP NOISE STABILITY	101
102	D3400	PREP FOR & SUPPORT PROJECT INITIATION MEETING	102
103	D3450	PREP FOR & SUPPORT DCR	103
104	D3500	PREP FOR & SUPPORT REC SUBSYSTEM INTERNAL DESIGN REVIEW	104
105	D3550	PREP FOR & SUPPORT PDR	105
106	D3600	RECEIVER TEST PLAN, PROCEDURE & VERIFICATION	106
107	D3700	FABRICATE TEST FIXTURES & ELECTRONIC BOXES	107
108	D3750	PREP FOR & SUPPORT CDR	108
109	D3800	DESIGN REVIEW OF KEY RECEIVER COMPONENTS (86-2219)	109
110	D3810	REVIEW OF SUPPLIER COMPONENT TEST PROCEDURES (86-2219)	110
		EOS PLO SPECS & SOWs/DESIGN AND ANALYSIS (87-4263)	
111	D23080	PREP FOR & SUPPORT PDR (87-4274)	111
112	D23090	PREP FOR & SUPPORT CDR (87-4274)	112
113	D23100	PRELIM CRYSTAL OSC & VCGDO SPEC GENERATION	113



LRE Schedule	Critical Activity	1 Day Open/Complete	1 Day *CRITICAL*	Baseline Dates	EOS
Orig. Sched. Accompl'd	ID: 202 Network: EDS	SEL: F1/1 NOT 'I' AND F2/1 NOT 'L' AND F2/1 NOT 'M'	ORD: F2/12 AN	Actual - Planned	

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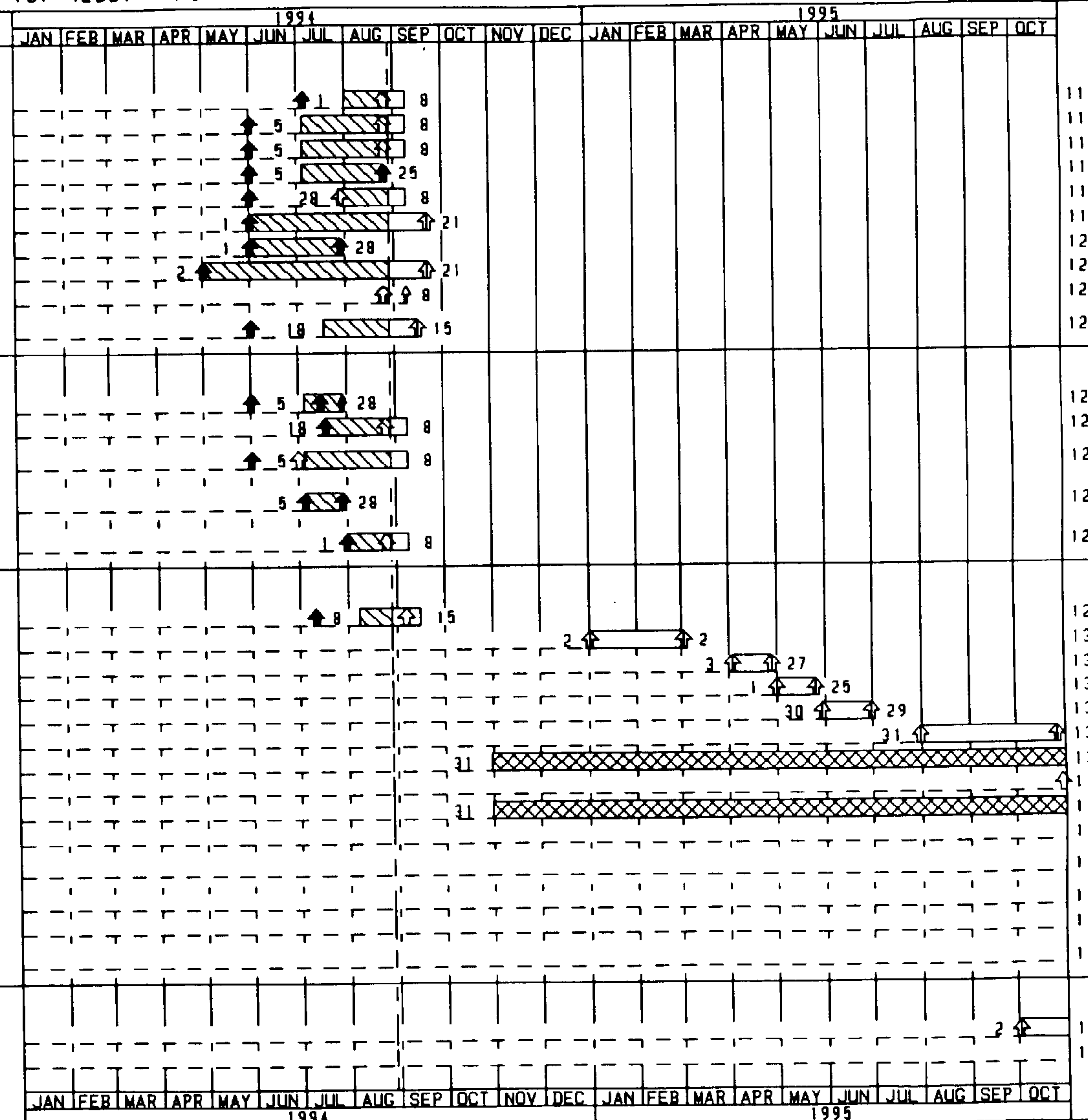
Subassembly: EOS PLO SPECS & SOWs/DESIGN AND ANALYSIS (87-4263) As Of: 29-AUG-94

	Activity Code	Activity Description
		EOS PLO SPECS & SOWs/DESIGN AND ANALYSIS (87-4263)
114	D23200	FINAL CRYSTAL OSC & VCGDO SPEC GENERATION
115	D23300	COMPLETE MECHANICAL ANALYSIS & REPORT
116	D23400	COMPLETE MATERIALS ANALYSIS & REPORT
117	D23500	COMPLETE THERMAL ANALYSIS & REPORT
118	D23600	COMPLETE EMI ANALYSIS & REPORT
119	D23700	COMPLETE ELECTRICAL ANALYSIS & REPORT
120	D23800	COMPLETE RAD HARDNESS ANALYSIS & REPORT
121	D23900	COMPLETE MANUFACTURING DESIGN SUPPORT
122	D24000	PLO INTERNAL CDR
123	D24020	PLO RELIABILITY REPORTS - ELECTRONIC STRESS, RELIABILITY & WORST CASE (87-4276)
		EOS PLO DRAWINGS (87-4264)
124	D24100	PLO MECHANICAL DRAWINGS - 1ST 5 DWGS
125	D24200	PLO MECHANICAL DRAWINGS - LAST 8 DWGS
126	D24300	PLO ELECTRICAL DRAWINGS - BLOCK DIAGRAM, 2 SCHEMATICS, 1 ASSY DWG
127	D24400	PLO ELECTRICAL DRAWINGS - 3 SCHEMATICS & 2 ASSY DWGS
128	D24500	PLO ELECTRICAL DRAWINGS - 3 SCHEMATICS & 2 ASSY DWGS
		EOS PLO MANUFACTURING FAB, ASSEMBLY & CHECKOUT (87-4266)
129	D24600	PRELIM PLO MANUFACTURING PLAN (CDRL 023)
130	D24700	FINAL PLO MANUFACTURING PLAN (CDRL 023)
131	D24800	MFG SHOP ORDER PREP FOR 4 BOXES & CCAs
132	D24900	MFG SHOP ORDER PREP FOR 12 MECHANICAL PARTS
133	D25000	MFG SHOP ORDER PREP FOR ACCEPTANCE TEST
134	D25100	FAB 4 PLO/PLL HOUSINGS
135	D25190	B-PF A1 RECEIVE VC GDO FOR PLO
136	D25200	ASSEMBLE 1ST SET OF PLOs (2 DROs, 2PLOs, CCAs)
137	D25290	B-PF A1 RECEIVE CRYSTAL OSC FOR PLO
138	D25300	TUNE & CHECKOUT 1ST SET OF PLOs
139	D25400	FINAL PREP 1ST SET OF PLOs FOR ENVIRONMENTAL TESTS
140	D25500	ASSEMBLE 2ND SET OF PLOs (2 DROs, 2 PLOs)
141	D25600	TUNE & CHECKOUT 2ND SET OF PLOs
142	D25700	FINAL PREP 2ND SET OF PLOs FOR ENVIRONMENTAL TESTS
		EOS PLO TEST DOCUMENTATION (87-4277)
143	D22800	PLO TEST PROCEDURES
144	D22900	PLO MASTER TEST PLAN



LRE Schedule | Orig. Sched. Accompl'd | Critical Activity | ID: 202 Network: EOS | 1 Day Open/Complete | SEL: F1/1 NOT '1' AND F2/1 NOT 'L' AND F2/1 NOT 'M' | 1 Day *CRITICAL* | ORD: F2/12 AN | Baseline Dates | Actual - Planned | EOS

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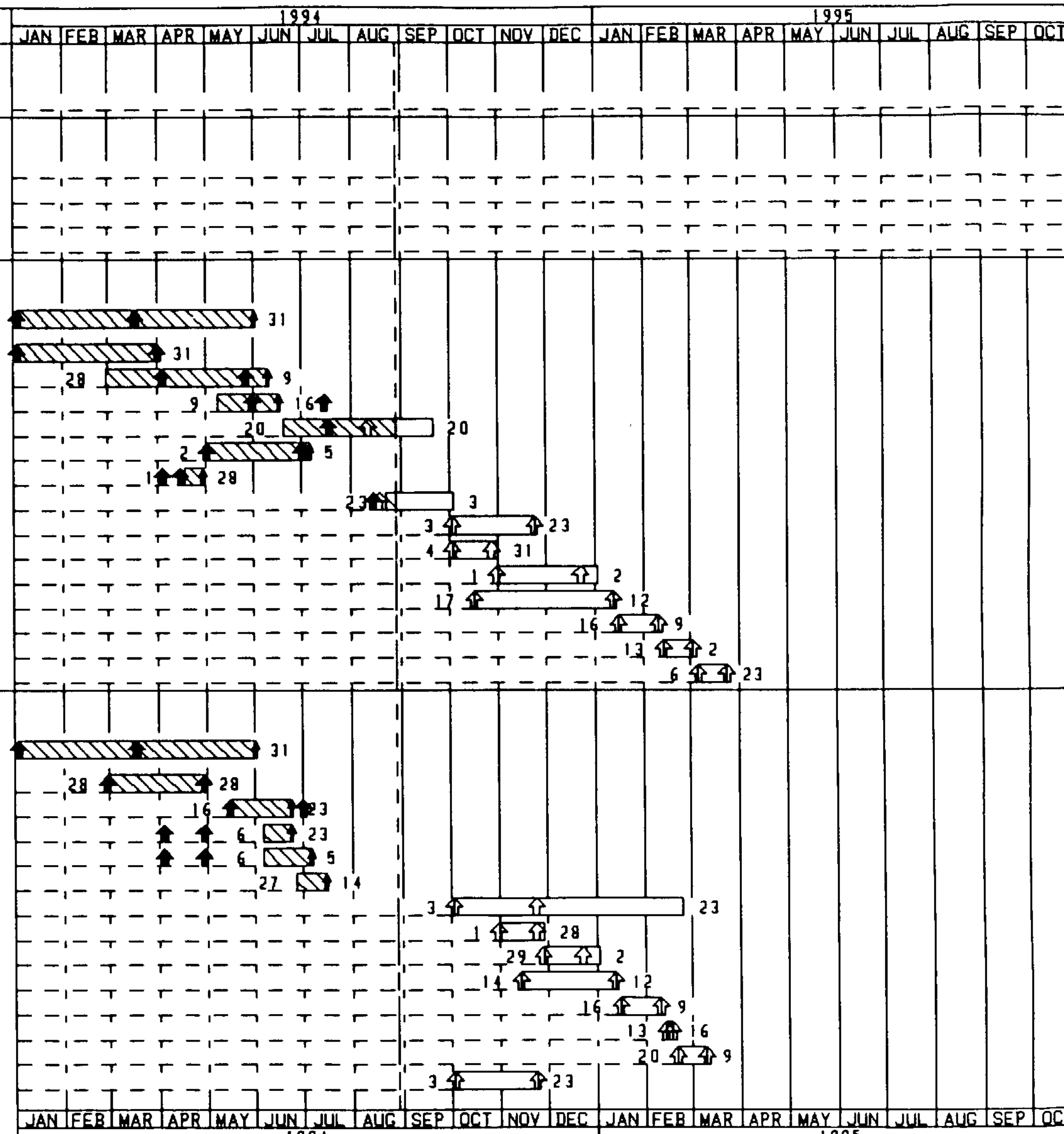
Subassembly: EOS PLO TEST DOCUMENTATION (87-4277)   As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS PLO TEST DOCUMENTATION (87-4277)	
145	D23000	PLO TEST REPORTS	145
		EOS PLO TESTING (87-4268)	
146	D25800	1ST SET PLOs - ENVIRONMENTAL QUAL TESTS	146
147	D25900	1ST SET PLOs - ENVIRONMENTAL THERMAL VAC TESTS	147
148	D26000	1ST SET PLOs - ENVIRONMENTAL THERMAL CYCLE TESTS	148
149	D26100	2ND SET PLOs - ALL ENVIRONMENTAL TESTS	149
		EOS SIGNAL PROCESSOR ASSY - DIGITAL PROCESSING (68-2231)	
150	D3930	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWN TO SIGNAL PROC- DIGITAL PROC	150
151	D3950	DESIGN & ANALYSIS - DIGITAL PROC	151
152	D4000	PROCURE BREADBOARD PARTS - DIGITAL PROC	152
153	D4020	ASSEMBLE BREADBOARD - DIGITAL PROC	153
154	D4030	TEST BREADBOARD - DIGITAL PROC	154
155	D4050	STRESS ANALYSIS (CDRL 109) - DIGITAL PROC	155
156	D4100	LOGIC DIAGRAMS (CDRL 302)- PRELIM - DIGITAL PROC	156
157	D4150	LOGIC DIAGRAMS (CDRL 302)- FINAL - DIGITAL PROC	157
158	D4200	CCA TEST INSTRUCTIONS - DIGITAL PROC	158
159	D4250	SCHEMATICS - DIGITAL PROC	159
160	D4300	CCA DRAFTING & ARTWORK - DIGITAL PROC	160
161	D4350	DOCUMENTATION CHECK - DIGITAL PROC	161
162	D4400	PROCURE PARTS FOR CCA PROTOTYPING - DIGITAL PROC	162
163	D4420	ASSEMBLE CCA PROTOTYPES - DIGITAL PROC	163
164	D4430	TEST CCA PROTOTYPES - DIGITAL PROC	164
		EOS SIGNAL PROCESSOR ASSY - ANALOG PROCESSING (67-2232)	
165	D4440	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWN - ANALOG PROC	165
166	D4450	CONCEPTUAL DESIGN - ANALOG PROC	166
167	D4460	DETAILED DESIGN - ANALOG PROC	167
168	D4500	SIMULATION & ANALYSIS - ANALOG PROC	168
169	D4550	PARTS STRESS ANALYSIS (CDRL 109) - ANALOG PROC	169
170	D4560	REDESIGN ANALOG-MUX/AD CONV CCA FOR OBSOLENCE	170
171	D4600	CCA TEST INSTRUCTIONS - ANALOG PROC	171
172	D4650	SCHEMATICS - ANALOG PROC	172
173	D4700	CCA LAYOUT & ARTWORK - ANALOG PROC	173
174	D4750	DOCUMENTATION CHECK - ANALOG PROC	174
175	D4800	PROCURE PARTS FOR CCA PROTOTYPING - ANALOG PROC	175
176	D4820	ASSEMBLE CCA PROTOTYPES - ANALOG PROC	176
177	D4840	TEST CCA PROTOTYPES - ANALOG PROC	177
178	D4855	DETECTOR SPEC REVISIONS	178



LRE Schedule	Critical Activity	I Day Open/Complete	I Day *CRITICAL*	Baseline Dates	EOS
Orig. Sched. Accompl'd	ID:202 Network:EDS	SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M'	ORD: F2/12 AN	Actual - Planned	

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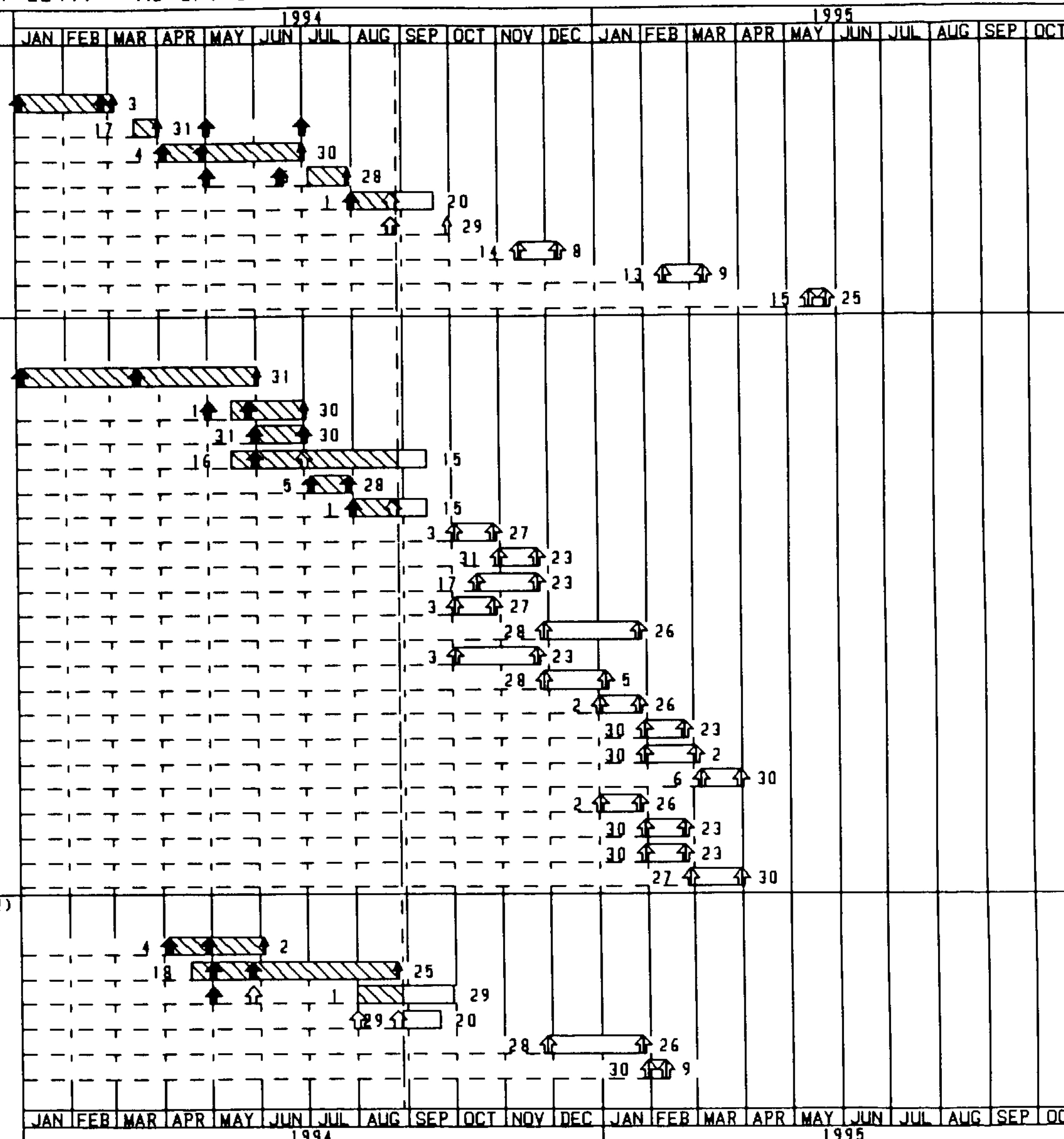
Subassembly: EOS POWER SUBSYSTEM - DC/DC CONVERTER (67-2241) As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS POWER SUBSYSTEM - DC/DC CONVERTER (67-2241)	
179	D4860	DC/DC CONVERTER PROPOSAL EVALUATION	179
180	D4910	DC/DC CONVERTER SUPPLIER AUDITS	180
181	D4920	DC/DC CONV INTERIM SPEC UPDATE	181
182	D4930	2 EA SELECTED VENDORS REPROPOSALS	182
183	D4960	DC/DC CONVERTER FINAL SUPPLIER SELECTION	183
184	D5010	RELEASE DC/DC CONVERTER SPECS AE 24693, 24958	184
185	D5020	DC/DC CONV SUPPLIER POST AWARD REVIEW #1	185
186	D5030	DC/DC CONV SUPPLIER POST AWARD REVIEW #2	186
187	D5040	DC/DC CONV SUPPLIER POST AWARD REVIEW #3	187
		EOS POWER SUBSYSTEM - CONTROL & DISTRIBUTION (67-2242)	
188	D5060	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWM - PWR CONTROL	188
189	D5110	INTERCONNECTION DESIGN - A1	189
190	D5160	INTERCONNECTION DESIGN - A2	190
191	D5210	POWER CONTROL PWB DESIGN	191
192	D5260	HARNESS DESIGN - A1	192
193	D5310	HARNESS DESIGN - A2	193
194	D5360	PWB SCHEMATIC - PWR CONTROL	194
195	D5410	PWB LAYOUT & ARTWORK - PWR CONTROL	195
196	D5460	PWB CHECK - PWR CONTROL	196
197	D5510	CCA TEST INSTRUCTIONS - PWR CONTROL	197
198	D5560	CCA PROTOTYPING - PWR CONTROL	198
199	D5610	A1 BACKPLANE WIRE LIST - ENG DESIGN	199
200	D5660	A2 BACKPLANE WIRE LIST - ENG DESIGN	200
201	D5710	HARNESS DRAFTING - A1	201
202	D5760	HARNESS CHECK - A1	202
203	D5810	HARNESS DRAFTING - A2	203
204	D5850	HARNESS CHECK - A2	204
205	D5880	A1 BACKPLANE WIRE LIST - DRAFTING	205
206	D5900	A1 BACKPLANE WIRE LIST - CHECK	206
207	D5950	A2 BACKPLANE WIRE LIST - DRAFTING	207
208	D6000	A2 BACKPLANE WIRE LIST - CHECK	208
		INTEG ELECT DESIGN - TEST PLANS, PROCEDURES & FIXTS(67-2252)	
209	D6010	SIGNAL PROC TEST SET DESIGN	209
210	D6020	1553 I/F TEST CONTROLLER DEV FOR BREADBOARD TEST	210
211	D6040	SIGNAL PROC TEST SET ASSEMBLY	211
212	D6045	TEST PLANS	212
213	D6050	DEVELOP SIG PROC TEST PROCEDURES	213
214	D6055	ANTENNA DRIVE TEST PROCEDURES	214



LRE Schedule | Orig. Sched. Accompl'd | Critical Activity | ID:202 Network:EDS | 1 Day Open/Complete | SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M' | 1 Day *CRITICAL* | ORD: F2/12 AN | Baseline Dates | Actual - Planned | EOS

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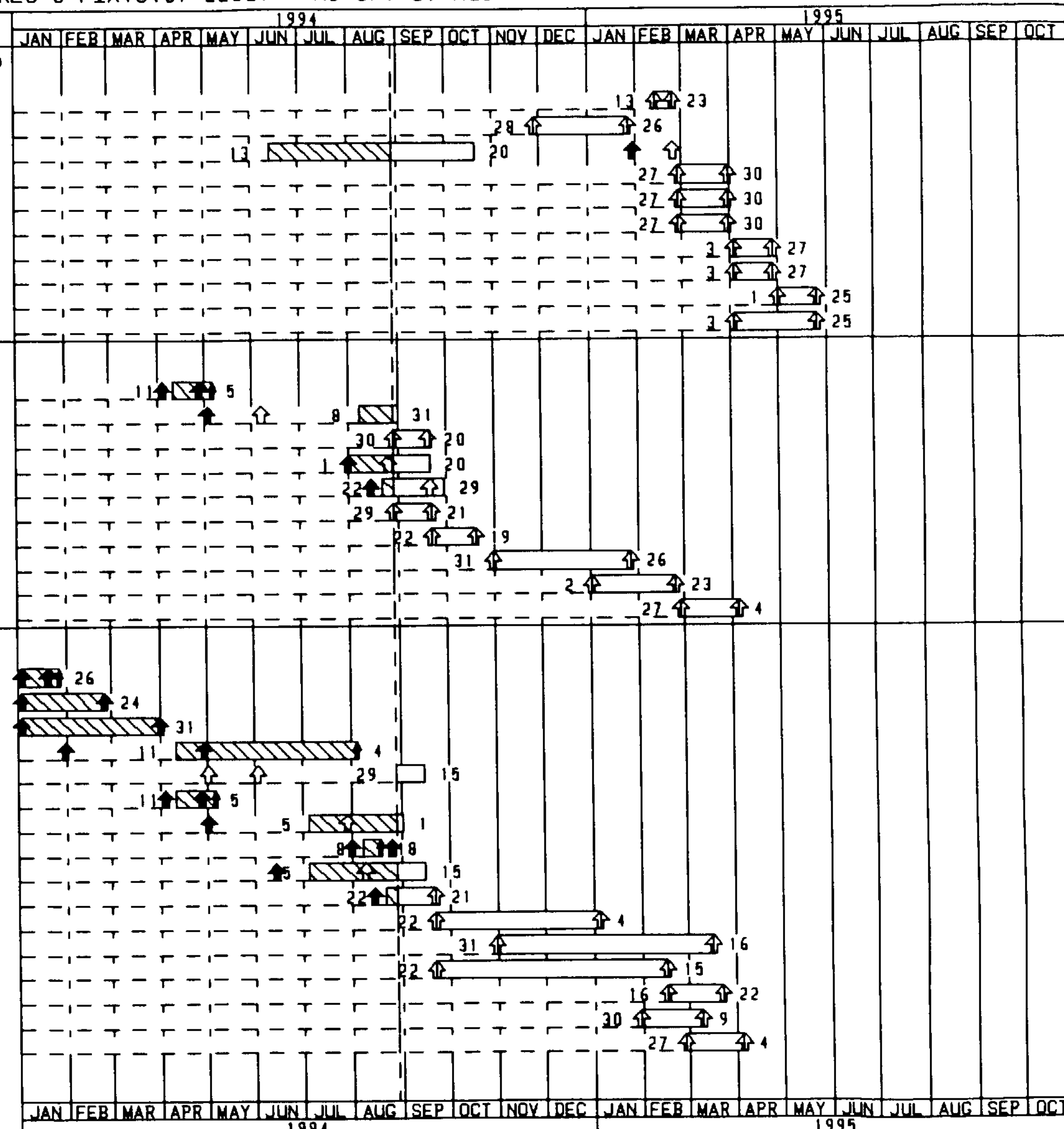
Subassembly: INTEG ELECT DESIGN - TEST PLANS, PROCEDURES & FIXTS(67-2252) As Of: 29-AUG-94

	Activity Code	Activity Description	
		INTEG ELECT DESIGN - TEST PLANS, PROCEDURES & FIXTS(67-2252)	
215	D6060	DETECTOR/PREAMP TEST PROCEDURES	215
216	D6070	1553 I/F TEST CONTROLLER DEV FOR CCA PROTOTYPES	216
217	D6080	ANALOG CCA TEST ADAPTER DESIGN	217
218	D6100	EXTENDER & I/O CARD DESIGN	218
219	D6120	MISC TEST FIXTURES DESIGN	219
220	D6140	PROCURE PARTS FOR ANALOG CCA ADAPTER FAB	220
221	D6160	ANALOG CCA TEST ADAPTER FAB	221
222	D6170	PROCURE PARTS FOR MISC TEST FIXTURE FAB	222
223	D6180	MISC TEST FIXTURES FAB	223
224	D6190	TEST FIXTURES FAB SUPPORT & CHECKOUT	224
		EOS ELECTRONICS INTEGRATED PRODUCT TEAM (67-2253)	
225	D6200	PREP FOR & SUPPORT DCR	225
226	D6250	INTERNAL DESIGN REVIEWS - ELECT IPT	226
227	D6300	TEST PLAN REVIEWS - ELECT IPT	227
228	D6330	SPEC UPDATE - ELECT IPT	228
229	D6350	SPEC SIGNOFF - ELECT IPT	229
230	D6400	PREP FOR & SUPPORT PDR	230
231	D6430	INTERNAL DESIGN REVIEW - POST PDR - ELECT IPT	231
232	D6450	DRAWING SIGNOFF - ELECT IPT	232
233	D6500	TEST PROCEDURE SIGNOFF - ELECT IPT	233
234	D6550	PREP FOR & SUPPORT CDR	234
		EOS A1 MECHANICAL DESIGN (61-2301)	
235	D6600	PREP FOR & SUPPORT PROJECT INITIATION MEETING	235
236	D6650	REQUIREMENTS FLOWDOWNSUPPORT - SYSTEM MATRIX	236
237	D6700	BOTTOM MOUNT CAD MODEL - A1	237
238	D6750	BOTTOM MOUNT STRESSES - A1	238
239	D6800	PRELIM STRESS REPORT- CDRL 113 - A1	239
240	D6850	PREP FOR & SUPPORT DCR - A1	240
241	D6900	UPDATE 3D CAD MODEL - A1	241
242	D6950	BOTTOM MOUNT ICD UPDATE - A1	242
243	D7000	PRELIM NASTRAN MODEL- CDRL 102 - A1	243
244	D7050	PREP FOR & SUPPORT PDR - A1	244
245	D7100	REVISE CAD MODEL - A1	245
246	D7150	DETAIL DRAWING RELEASE - A1	246
247	D7200	FINAL STRESS ANALYSIS - A1	247
248	D7250	FINAL STRESS REPORT (CDRL 113) - A1	248
249	D7300	FINAL NASTRAN MODEL (CDRL 102) - A1	249
250	D7350	PREP FOR & SUPPORT CDR - A1	250



LRE Schedule | Critical Activity | 1 Day Open/Complete | 1 Day *CRITICAL* | Baseline Dates | INTE

Orig. Sched. Accompl'd | ID:202 Network:EOS | SEL: F1/1 NOT 'I' AND F2/1 NOT 'L' AND F2/1 NOT 'M' | ORD: F2/12 AN | Actual - Planned

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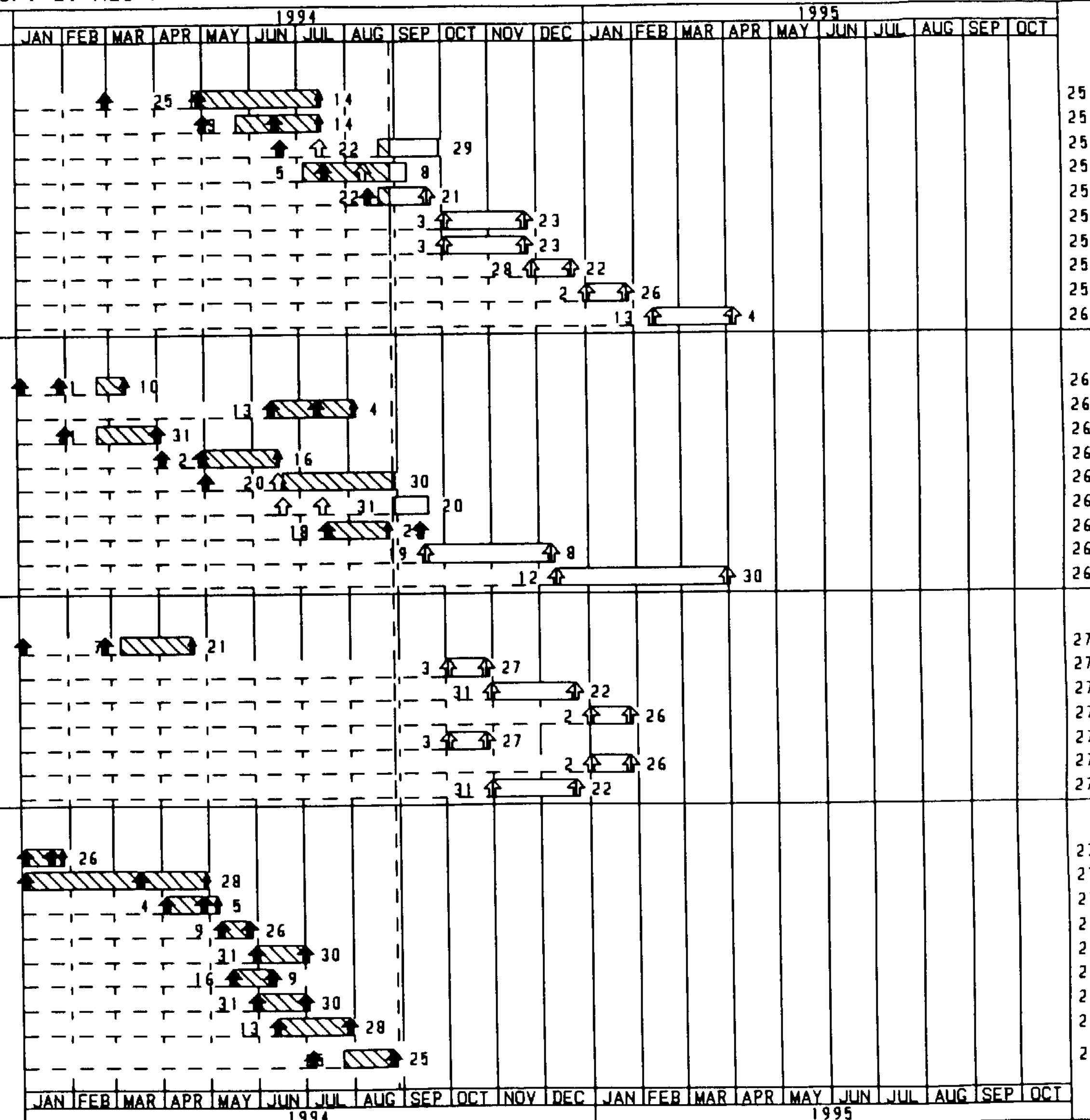
Subassembly: EOS A2 MECHANICAL DESIGN (61-2302) As Of: 29-AUG-94

	Activity Code	Activity Description
		EOS A2 MECHANICAL DESIGN (61-2302)
251	D7400	UPDATE 3D CAD MODEL - A2
252	D7450	PRELIM STRESS ANALYSIS - A2
253	D7500	PRELIM A1 & A2 MECH STRESS REPORTS (CDRL 113)
254	D7550	PRELIM NASTRAN MODEL (CDRL 102) - A2
255	D7600	PREP FOR & SUPPORT PDR - A2
256	D7650	DETAILED DRAWINGS - A2
257	D7700	FINAL STRESS ANALYSIS - A2
258	D7750	FINAL STRESS REPORT (CDRL 113) - A2
259	D7800	FINAL NASTRAN MODEL (CDRL 102) - A2
260	D7850	PREP FOR & SUPPORT CDR - A2
		EOS MECHANICAL/THERMAL INTEGRATED PRODUCT TEAM (61-2305)
261	D7900	CONCEPTUAL PACKAGE REVIEW - M/T IPT- A1
262	D7910	CONCEPTUAL PACKAGE REVIEW - M/T IPT - A2
263	D7950	ID DRAWINGS TO CHANGE - M/T IPT
264	D8000	ID SPECS TO BE CHANGED - M/T IPT
265	D8050	INTERNAL PACKAGING REVIEW - M/T IPT
266	D8100	ANSWER PACKAGE REVIEW ACTION ITEMS- M/T IPT
267	D8150	ID PROCEDURES TO BE CHANGED - M/T IPT
268	D8200	SPEC UPDATE SIGNOFF - M/T IPT
269	D8250	DRAWING SIGNOFF - M/T IPT
		EOS MECHANICAL COST REDUCTIONS (61-2320)
270	D8255	ALUMINUM RF SHELF STRESSES & THERMAL ANALYSIS
271	D8260	RF SHELF DRAWINGS
272	D8270	PREAMP DETECTOR ASSY RELOCATION
273	D8275	A1 MOTOR HOUSING
274	D8280	RELOCATE SCREWS
275	D8285	A2 SECONDARY REFLECTOR
276	D8290	COAX CLIP REDESIGN
		EOS A1 THERMAL ANALYSIS (62-2401)
277	D8300	PREP FOR & SUPPORT PROJECT INITIATION MEETING
278	D8320	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWN
279	D8350	PREP FOR & SUPPORT DCR
280	D8360	DESIGN CONCEPT REVIEW A1 ACTION ITEMS
281	D8380	PDR A1 PLANNING WITH NASA
282	D8400	MODIFY DETAILED A1 SINDA MODEL
283	D8450	REVISE A1 TRASYS MODEL
284	D8550	PREPARE REDUCED A1 SINDA MODEL
285	D8600	PREPARE & PUBLISH PRELIM A1 THERMAL MATH MODEL (CDRL 103)



LRE Schedule
Orig Sched. Accompl'd
Critical Activity
ID: 202 Network: EOS
1 Day Open/Complete
SEL: F1/1 NOT 'I' AND F2/1 NOT 'L' AND F2/1 NOT 'M'
1 Day *CRITICAL*
ORD: F2/12 AN
Baseline Dates
Actual - Planned
EOS

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Subassembly: EOS A1 THERMAL ANALYSIS (62-2401) As Of: 29-AUG-94

	Activity Code	Activity Description	1994 JAN–DEC / 1995 JAN–OCT	
		EOS A1 THERMAL ANALYSIS (62-2401)		
286	D8650	PRELIMINARY A1 CIRCUIT CARD ANALYSIS	29 29	286
287	D8700	PREP FOR & SUPPORT PDR	29 21	287
288	D8750	FINAL A1 CIRCUIT CARD ANALYSIS	14 22	288
289	D8800	A1 TRASYS MODEL ADJUSTMENTS	28 22	289
290	D8850	DETAILED A1 SINDA MODEL ADJUSTMENTS	12 5	290
291	D8900	REDUCED A1 SINDA MODEL ADJUSTMENTS	9 26	291
292	D8950	CDR A1 PLANNING WITH NASA	30 23	292
293	D9000	PREPARE & PUBLISH UPDATED A1 THERMAL MATH MODEL (CDRL 103)	30 23	293
294	D9050	PREPARE A1 THERMAL INTERFACE CONTROL DRAWING	27 30	294
295	D9100	A1 PREP FOR & SUPPORT CDR	27 4	295
		EOS A2 THERMAL ANALYSIS (62-2402)		
296	D9150	PREP FOR & SUPPORT PROJECT INITIATION MEETING	26	296
297	D9200	PREP FOR & SUPPORT DCR	11 5	297
298	D9210	DESIGN CONCEPT REVIEW A2 ACTION ITEMS	9 26	298
299	D9230	PDR A2 PLANNING WITH NASA	31 30	299
300	D9250	MODIFY DETAILED A2 SINDA MODEL	2 26	300
301	D9300	REVISE A2 TRASYS MODEL	31 30	301
302	D9400	PREPARE REDUCED A2 SINDA MODEL	13 1	302
303	D9450	PREPARE & PUBLISH PRELIM A2 THERMAL MATH MODEL (CDRL 103)	5 25	303
304	D9500	PRELIMINARY A2 CIRCUIT CARD ANALYSIS	29 29	304
305	D9550	A2 PREP FOR & SUPPORT PDR	6 21	305
306	D9600	FINAL A2 CIRCUIT CARD ANALYSIS	14 22	306
307	D9650	A2 TRASYS MODEL ADJUSTMENTS	28 22	307
308	D9700	DETAILED A2 SINDA MODEL ADJUSTMENTS	12 5	308
309	D9750	REDUCED A2 SINDA MODEL ADJUSTMENTS	9 26	309
310	D9800	CDR A2 PLANNING WITH NASA	30 23	310
311	D9850	PREPARE & PUBLISH UPDATED A2 THERMAL MATH MODEL	30 23	311
312	D9900	PREPARE A2 THERMAL INTERFACE CONTROL DRAWING	27 30	312
313	D9950	A2 PREP FOR & SUPPORT CDR	27 4	313
		EOS THERMAL SUPPORT OF TESTING (62-4730)		
314	D9955	A1 THERMAL TEST PREPARATION		314
315	D9960	A2 THERMAL TEST PREPARATION		315
316	D9965	SUPPORT A1 THERMAL BALANCE TEST		316
317	D9970	SUPPORT A2 THERMAL BALANCE TEST		317
318	D9975	PREPARE FINAL A1 THERMAL MODEL		318
319	D9980	PREPARE FINAL A2 THERMAL MODEL		319

LRE Schedule / Orig. Sched. Accompl'd	Critical Activity / ID:202 Network:EOS	1 Day Open/Complete / SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M'	1 Day *CRITICAL* / ORD: F2/I2 AN	Baseline Dates / Actual - Planned	EOS

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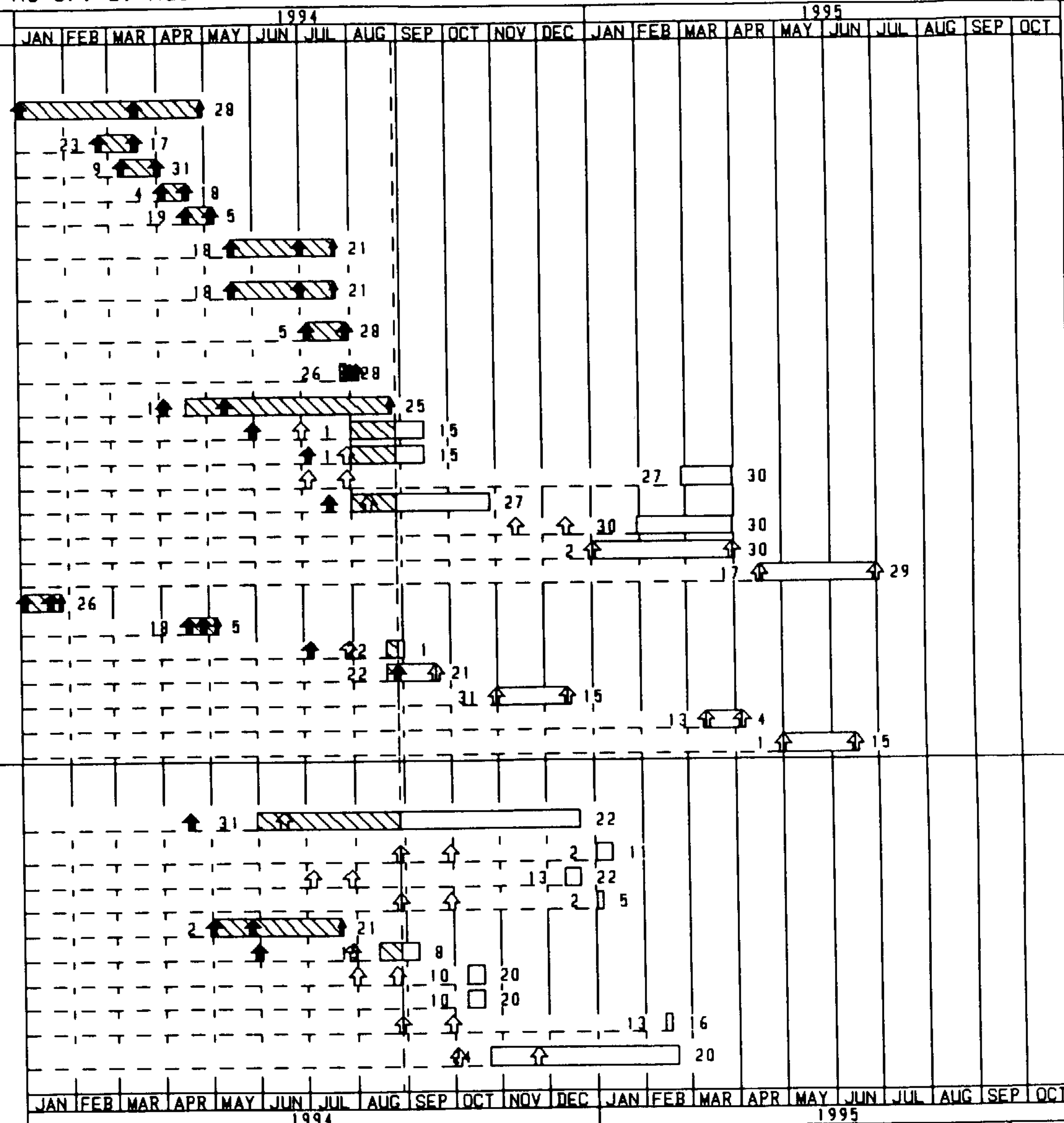
Subassembly: EOS ANTENNA SUBSYSTEM DESIGN (89-2510) As Of: 29-AUG-94

	Activity Code	Activity Description
		EOS ANTENNA SUBSYSTEM DESIGN (89-2510)
320	D10000	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWN TO ANTENNA SUBSYSTEM
321	D10005	TRADE STUDY - REVIEW & UPDATE SPECS
322	D10010	TRADE STUDY - PREPARE DRAFT OF EOS BID PACKAGE
323	D10015	TRADE STUDY - COMPILE COST ESTIMATES
324	D10020	TRADE STUDY - SUMMARIZE & PRESENT TRADES
325	D10025	TRADE STUDY PHASE 2 - EVALUATE MULTIPLE BE REFLECTOR SUPPLIERS
326	D10030	TRADE STUDY PHASE 2 - EVALUATE MULTIPLE COMPOSITE REFLECTOR SUPPLIERS
327	D10035	TRADE STUDY PHASE 2 - TRADE SUPPLIERS/MATERIAL VS COST, SCHEDULE & RISK
328	D10040	TRADE STUDY PHASE 2 - CONDUCT CUSTOMER TRADE REVIEW
329	D10050	PRELIM REVIEW OF COMPONENT SPECS
330	D10100	CONFIRM COMPONENT PERFORMANCE
331	D10150	CONFIRM SUBSYSTEM PERFORMANCE
332	D10200	REVIEW DRAWINGS
333	D10250	CALIBRATION ACCURACY STUDY
334	D10300	UPDATE TEST PROCEDURES- ANTENNA SUBSYSTEM
335	D10350	COMPLETE TEST FIXTURE DESIGN
336	D10400	COMPLETE TEST FIXTURE FAB
337	D10450	PREP FOR & SUPPORT PROJECT INITIATION MEETING
338	D10500	PREP FOR & SUPPORT DCR
339	D10550	PREP FOR & SUPPORT INTERNAL DESIGN REVIEW
340	D10600	PREP FOR & SUPPORT PDR
341	D10650	PREP FOR & SUPPORT CAL PEER REVIEW #1
342	D10700	PREP FOR & SUPPORT CDR
343	D10750	PREP FOR & SUPPORT CAL PEER REVIEW #2
		EOS ANTENNA SUBSYSTEM PROCUREMENT SUPPORT (89-2519)
344	D10800	SPEC UPDATE & REVIEW (MOTOR, MUX, DIPLEXER, BEARINGS)
345	D10810	PRE-AWARD AUDIT AT VENDOR - MOTOR BEARINGS
346	D10815	DRIVE MOTOR VENDOR SELECTION
347	D10820	PRE-AWARD AUDIT AT VENDOR - DRIVE MOTOR
348	D10822	RELEASE REVISED REFLECTOR SPEC/DRAWING
349	D10826	A2 REFLECTOR OUT FOR FINAL QUOTES
350	D10830	PRE-AWARD AUDIT AT VENDOR - REFLECTOR
351	D10835	AWARD A2 REFLECTOR CONTRACT
352	D10840	PRE-AWARD AUDIT AT VENDOR - FEEDHORN/MUX
353	D10850	INITIATE PROCUREMENT (MOTOR, MUX, DIPLEXER, REFLECTOR & BEARINGS)



LRE Schedule — Orig. Sched. Accompl'd — Critical Activity — ID:202 Network:EOS — 1 Day Open/Complete — SEL: F1/1 NOT 'I' AND F2/1 NOT 'L' AND F2/1 NOT 'M' — 1 Day *CRITICAL* — ORD: F2/12 AN — Baseline Dates — Actual - Planned — EOS

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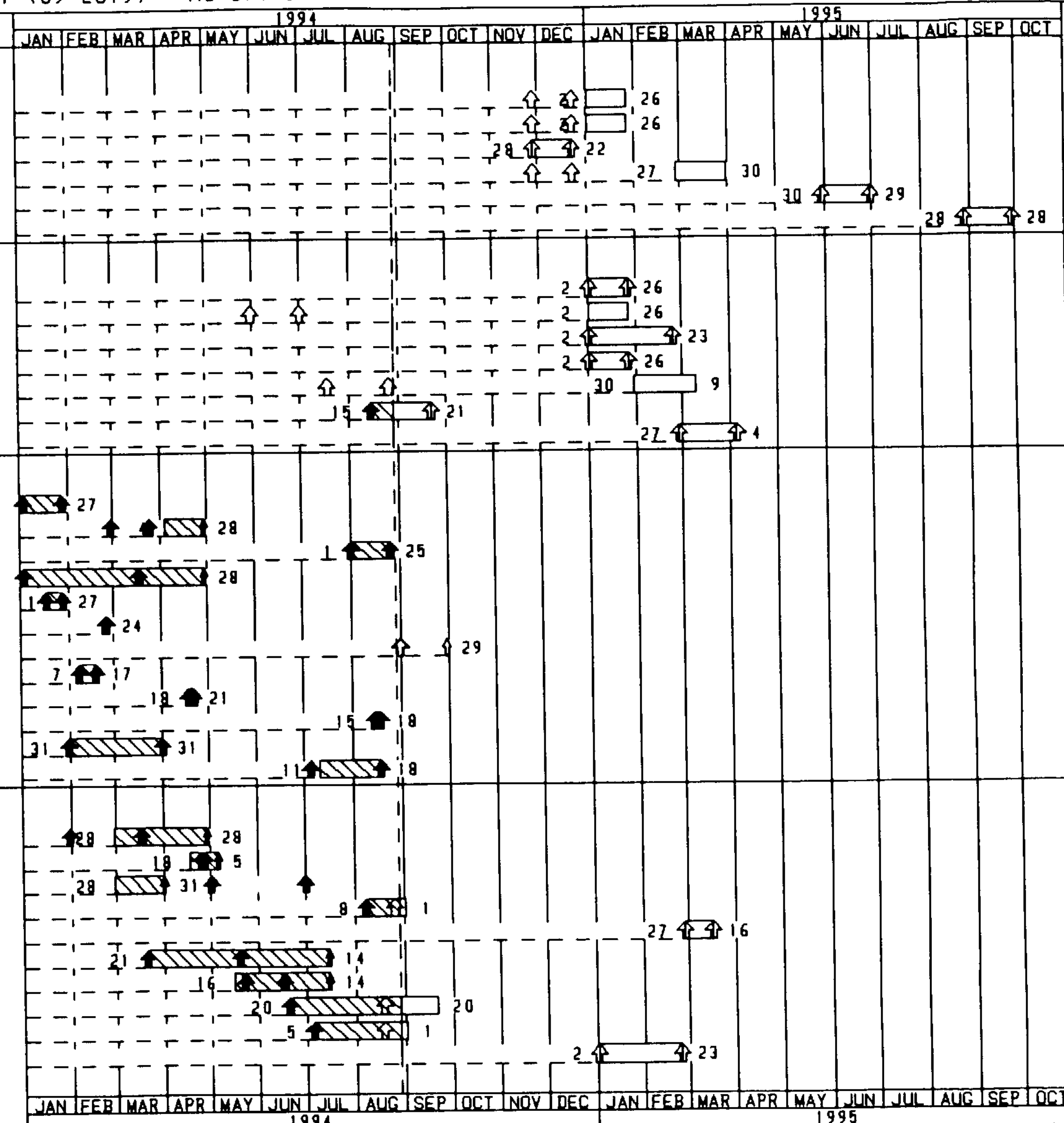
Subassembly: EOS ANTENNA SUBSYSTEM PROCUREMENT SUPPORT (89-2519)   As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS ANTENNA SUBSYSTEM PROCUREMENT SUPPORT (89-2519)	
354	D10860	POST-AWARD REVIEW AT VENDOR - MOTOR BEARINGS	354
355	D10870	POST-AWARD REVIEW AT VENDOR - DRIVE MOTOR	355
356	D10880	POST-AWARD REVIEW AT VENDOR - REFLECTOR	356
357	D10890	POST-AWARD REVIEW AT VENDOR - FEEDHORN/MUX	357
358	D10950	VENDOR INTERFACE STATUS REVIEWS	358
359	D10960	VENDOR INTERFACE STATUS REVIEWS - FINAL	359
		EOS DRIVE MOTOR MECHANICAL DESIGN (89-2520)	
360	D11050	A1 MOTOR HOUSING MOD- MECHANICAL	360
361	D11200	N2 PURGE REVIEW	361
362	D11250	DRAWING UPDATE- A1 HOUSING MOD	362
363	D11400	HOUSING MOD DESIGN- ELECTRICAL	363
364	D11450	TEST PROCEDURE UPDATE- DRIVE MOTOR	364
365	D11500	PREP FOR & SUPPORT PDR	365
366	D11550	PREP FOR & SUPPORT CDR	366
		EOS SOFTWARE PLANNING DOCUMENTS & REQUIREMENTS (52-1010)	
367	D13600	PRELIM SOFTWARE MANAGEMENT PLAN (CDRL 8)	367
368	D13610	UPDATE SOFTWARE MANAGEMENT PLAN (CDRL 8)	368
369	D13615	FINAL SOFTWARE MANAGEMENT PLAN (CDRL 8)	369
370	D13620	SUPPORT SYSTEM ENGR REQUIREMENTS FLOWDOWN	370
371	D13650	SOFTWARE STANDARDS & PROCEDURES PLAN (CDRL 402)	371
372	D13655	SOFTWARE PROCESS MANUAL	372
373	D13665	SOFTWARE STANDARDS & PROCEDURES MANUAL	373
374	D13700	PRELIM ACQUISITION ACTIVITIES PLAN (CDRL 508)	374
375	D13705	UPDATE ACQUISITION ACTIVITIES PLAN (CDRL 508)	375
376	D13710	FINAL ACQUISITION ACTIVITIES PLAN (CDRL 508)	376
377	D13750	PRELIM SOFTWARE ASSURANCE PLAN (CDRL 309)	377
378	D13800	FINAL SOFTWARE ASSURANCE PLAN (CDRL 309)	378
		EOS FIRMWARE DOCUMENTATION (52-2601)	
379	D12800	FINAL FIRMWARE CONCEPT DOCUMENT (CDRL 306-1)	379
380	D12850	PREP FOR & SUPPORT DCR	380
381	D12900	PRELIM FIRMWARE TEST PLAN (CDRL 33)	381
382	D12905	UPDATE FIRMWARE TEST PLAN (CDRL 33)	382
383	D12910	FINAL FIRMWARE TEST PLAN (CDRL 33)	383
384	D13000	PRELIM FIRMWARE REQUIREMENTS SPEC (CDRL 306-2)	384
385	D13050	PRELIM ARCHITECTURAL DESIGN DOC (CDRL 306-3)	385
386	D13100	PRELIM DETAIL DESIGN DOCUMENT (CDRL 306-5)	386
387	D13150	PRELIM FIRMWARE TEST PROCEDURES (CDRL 415)	387
388	D13170	FIRMWARE SUPPORT MANUAL (CDRL 306-7)	388



LRE Schedule | Orig. Sched Accompl'd | Critical Activity | 1 Day Open/Complete | 1 Day *CRITICAL* | Baseline Dates | Actual - Planned | EOS

ID:202 Network:EOS | SEL: F1/1 NOT '1' AND F2/1 NOT 'L' AND F2/1 NOT 'M' | DRD: F2/12 AN

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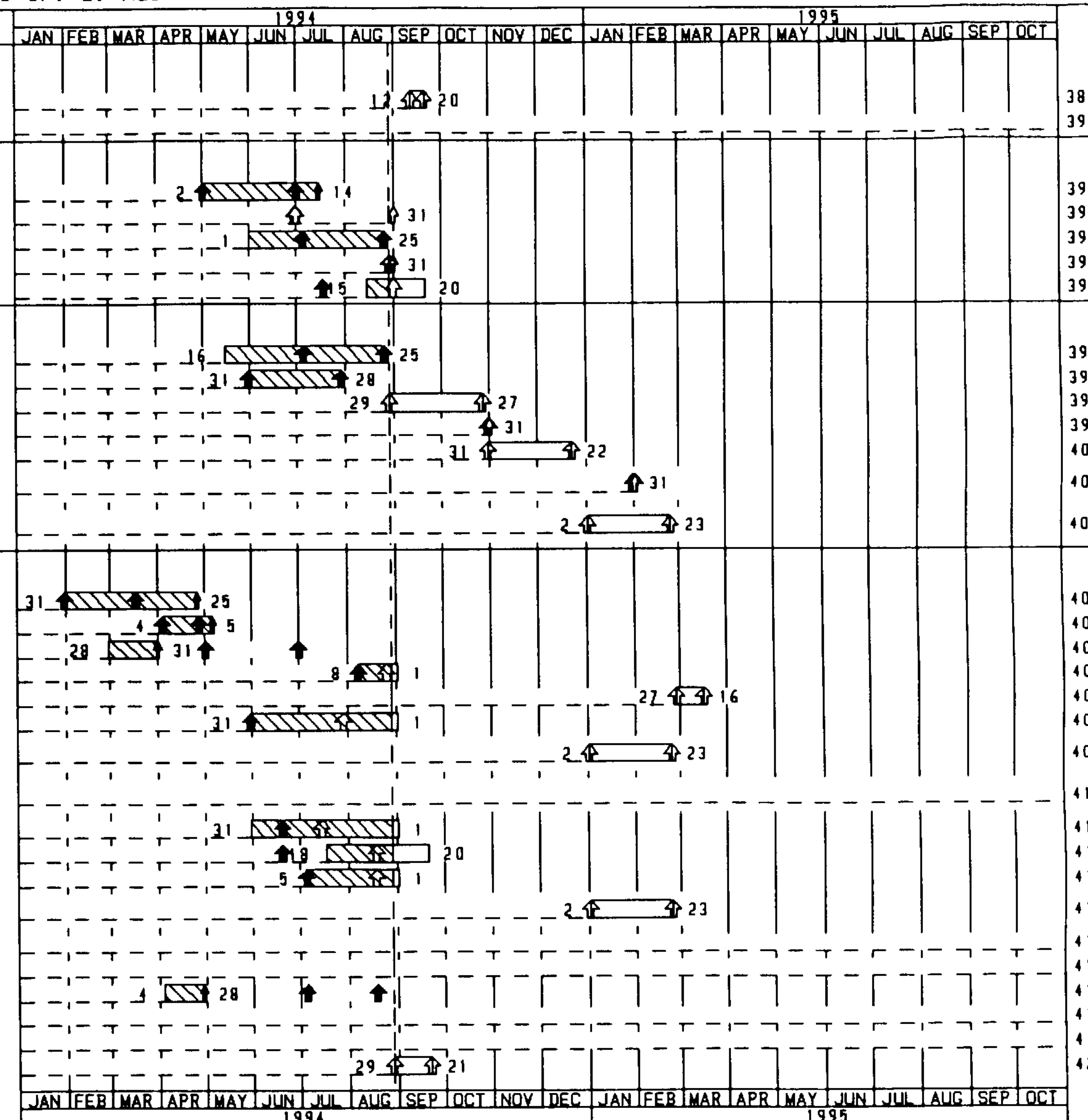
Subassembly: EOS FIRMWARE DOCUMENTATION (52-2601)   As Of: 29-AUG-94

	Activity Code	Activity Description
		EOS FIRMWARE DOCUMENTATION (52-2601)
389	D13200	PREP FOR & SUPPORT PDR
390	D13210	VERSION DESCRIPTION DOCUMENT FOR AR - CDRL 306-8
		EOS COMMAND & DATA HANDLING FIRMWARE (52-2602)
391	D13250	DESIGN COMMAND & DATA HANDLING FIRMWARE
392	D13300	1ST INTERNAL COMMAND & DATA HANDLING REVIEW
393	D13350	CODE COMMAND & DATA HANDLING FIRMWARE
394	D13400	FINAL INTERNAL COMMAND & DATA HANDLING REVIEW
395	D13450	CHECKOUT COMMAND & DATA HANDLING FIRMWARE
		EOS MODIFIED AMSU-A FIRMWARE (52-2603)
396	D13500	DESIGN INSTRUMENT CONTROL FIRMWAREMOD
397	D13505	CODE BREADBOARD INSTRUMENT CONTROL FIRMWARE
398	D13510	CODE INSTRUMENT CONTROL FIRMWARE MOD
399	D13520	INTERNAL REVIEW OF INSTRUMENT CONTROL CODE
400	D13540	CHECKOUT INSTRUMENT CONTROL FIRMWARE MOD
401	D13560	FINAL INTERNAL REVIEW OF INSTRUMENT CONTROL FIRMWARE MOD
402	D13580	INTEGRATE INSTRUMENT CONTROL WITH C & DH FIRMWARE
		EOS GSE SOFTWARE DOCUMENTATION (52-1011)
403	D13850	FINAL SOFTWARE CONCEPT DOC (CDRL 306-1)
404	D13900	PREP FOR & SUPPORT DCR
405	D13950	PRELIM SOFTWARE TEST PLAN (CDRL 33)
406	D13955	UPDATE SOFTWARE TEST PLAN (CDRL 33)
407	D13960	FINAL SOFTWARE TEST PLAN (CDRL 33)
408	D14050	PRELIM SOFTWARE REQUIREMENTS SPEC (CDRL 306-2)
409	D14070	UPDATE SOFTWARE REQUIREMENTS SPEC FOR CDR (CDRL 306-2)
410	D14090	FINAL SOFTWARE REQUIREMENTS SPEC FOR AR (CDRL 306-2)
411	D14100	PRELIM ARCHITECTURAL DESIGN DOC (CDRL 306-3)
412	D14150	PRELIM DETAIL DESIGN DOC (CDRL 306-5)
413	D14200	PRELIM SOFTWARE TEST PROCEDURES (CDRL 415)
414	D14210	UPDATE SOFTWARE TEST PROCEDURES FOR CDR (CDRL 415)
415	D14220	SOFTWARE TEST PROCEDURES FOR TRR (CDRL 415)
416	D14240	FINAL SOFTWARE TEST PROCEDURES FOR AR (CDRL 415)
417	D14250	PRELIM SOFTWARE USERS GUIDE (CDRL 306-10)
418	D14270	SOFTWARE USERS GUIDE FOR TRR (CDRL 306-10)
419	D14290	SOFTWARE USERS GUIDE FOR AR (CDRL 306-10)
420	D14300	PREP FOR & SUPPORT PDR



LRE Schedule | Critical Activity | 1 Day Open/Complete | 1 Day *CRITICAL* | Baseline Dates | EOS

Orig. Sched. Accompl'd | ID: 202 Network: EOS | SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M' | ORD: F2/12 AN | Actual - Planned

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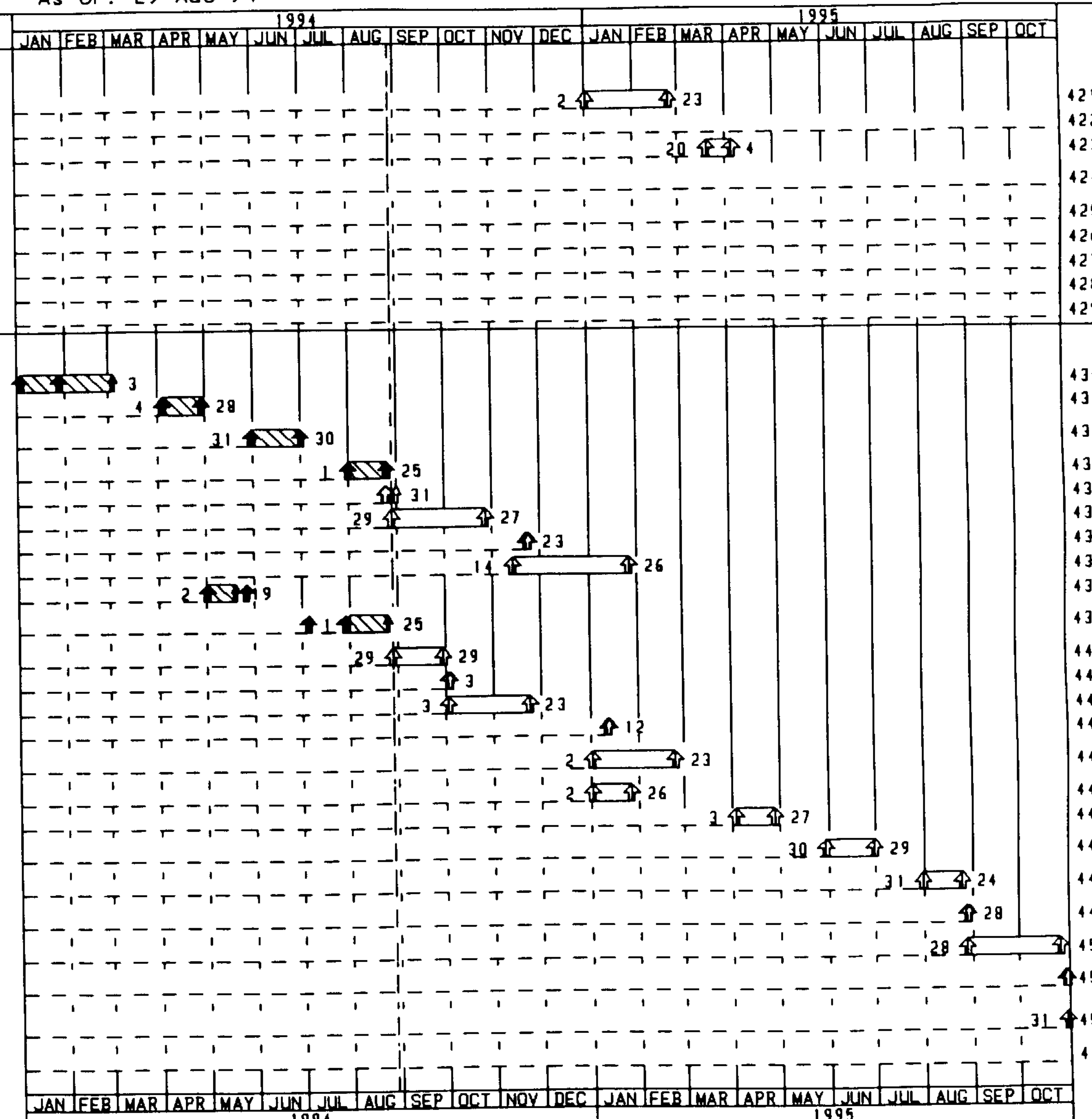
Subassembly: EOS GSE SOFTWARE DOCUMENTATION (52-1011) As Of: 29-AUG-94

	Activity Code	Activity Description
		EOS GSE SOFTWARE DOCUMENTATION (52-1011)
421	D14302	UPDATE DETAILED DESIGN DOCUMENT - CDRL 306-5
422	D14304	FINAL DETAILED DESIGN DOCUMENT - CDRL 306-5
423	D14307	PREP FOR & SUPPORT CDR
424	D14312	VERSION DESCRIPTION DOCUMENT FOR TRR - CDRL 306-8
425	D14315	VERSION DESCRIPTION DOCUMENT FOR AR - CDRL 306-8
426	D14330	SOFTWARE TEST REPORTS FOR TRR - CDRL 217
427	D14335	SOFTWARE TEST REPORTS FOR AR - CDRL 217
428	D14340	SOFTWARE TRR (TEST READINESS REVIEW) - CDRL 26
429	D14345	SOFTWARE AR (ACCEPTANCE REVIEW) - CDRL 28
		EOS GSE SOFTWARE - MODIFIED STE (52-1012)
430	D14350	CYCLE 1 PLANNING - STE
431	D14450	CYCLE 2 INPUT MOD - DETERMINE OBJECTIVES - STE
432	D14500	CYCLE 2 INPUT MOD - DETERMINE SUCCESS CRITERIA - STE
433	D14550	CYCLE 2 INPUT MOD - FORMULATE STRATEGY - STE
434	D14600	CYCLE 2 INPUT MOD - 1ST INTERNAL REVIEW - STE
435	D14650	CYCLE 2 INPUT MOD - DEVELOP CODE - STE
436	D14700	CYCLE 2 INPUT MOD - FINAL INTERNAL REVIEW - STE
437	D14750	CYCLE 2 INPUT MOD - VERIFY & VALIDATE CODE- STE
438	D14800	CYCLE 3 COMMAND MOD - DETERMINE OBJECTIVES- STE
439	D14850	CYCLE 3 COMMAND MOD - DETERMINE SUCESS CRITERIA- STE
440	D14900	CYCLE 3 COMMAND MOD - FORMULATE STRATEGY- STE
441	D14950	CYCLE 3 COMMAND MOD - 1ST INTERNAL REVIEW- STE
442	D15000	CYCLE 3 COMMAND MOD - DEVELOP CODE- STE
443	D15050	CYCLE 3 COMMAND MOD - FINAL INTERNAL REVIEW- STE
444	D15100	CYCLE 3 COMMAND MOD - VERIFY & VALIDATE CODE- STE
445	D15120	CYCLE 4 PLANNING- INTEGRATION- STE
446	D15150	CYCLE 4 INTEGRATION - DETERMINE OBJECTIVES- STE
447	D15200	CYCLE 4 INTEGRATION - DETERMINE SUCCESS CRITERIA - STE
448	D15250	CYCLE 4 INTEGRATION - FORMULATE STRATEGY - STE
449	D15300	CYCLE 4 INTEGRATION - PRE-CODE INTERNAL REVIEW - STE
450	D15350	CYCLE 4 INTEGRATION - DEVELOP CODE - STE
451	D15400	CYCLE 4 INTEGRATION - POST-CODE INTERNAL REVIEW - STE
452	D15450	CYCLE 4 INTEGRATION - VERIFY & VALIDATE CODE - STE
453	D15500	CYCLE 5 DRY RUN TESTING - STE



LRE Schedule	Critical Activity	1 Day Open/Complete	1 Day *CRITICAL*	Baseline Dates	EOS
Orig Sched Accompl'd	ID:202 Network:EOS	SEL: F1/1 NOT 'I' AND F2/1 NOT 'L' AND F2/1 NOT 'M'	ORD: F2/12 AN	Actual - Planned	

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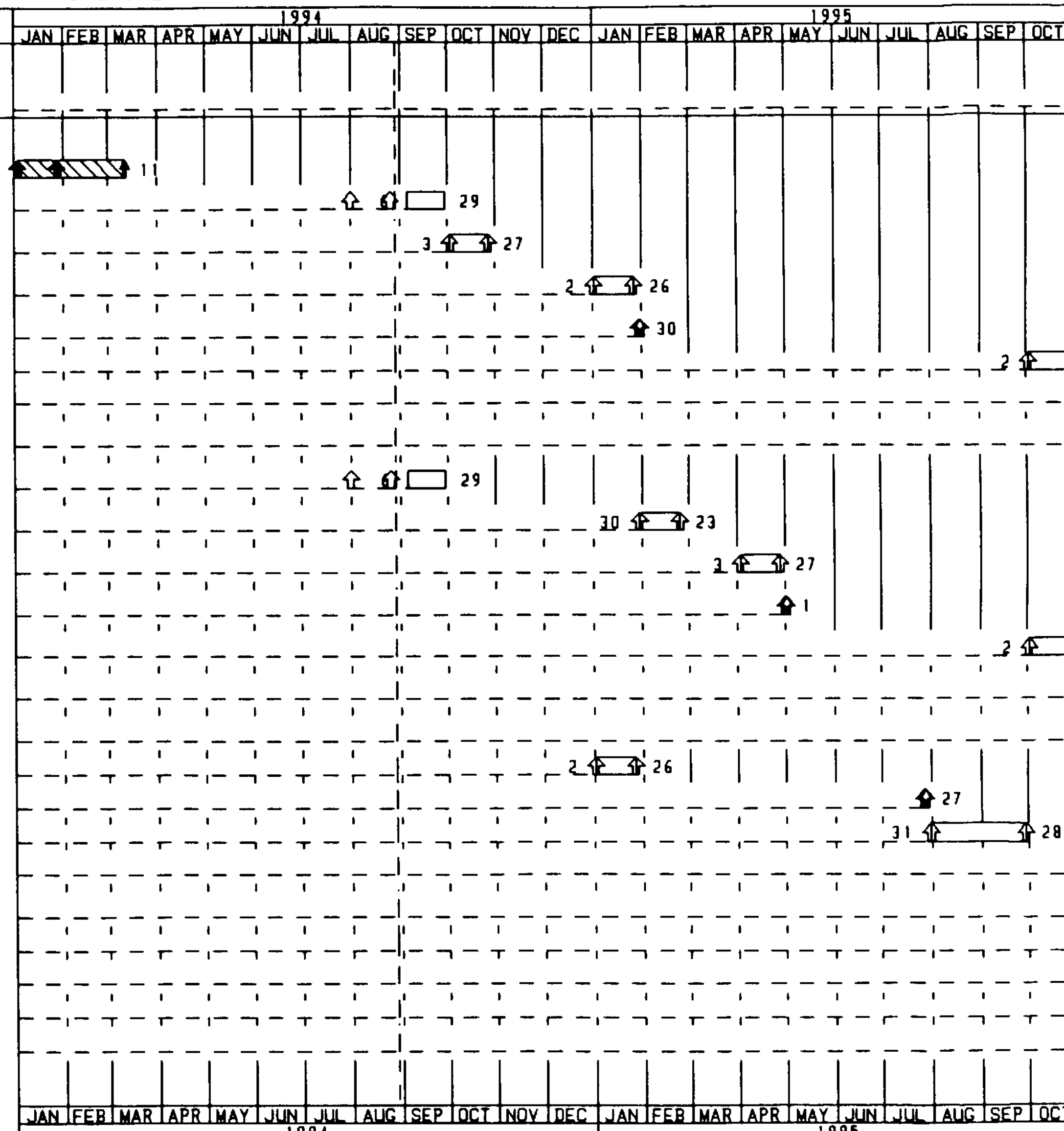
Subassembly: EOS GSE SOFTWARE - MODIFIED STE (52-1012) As Of: 29-AUG-94

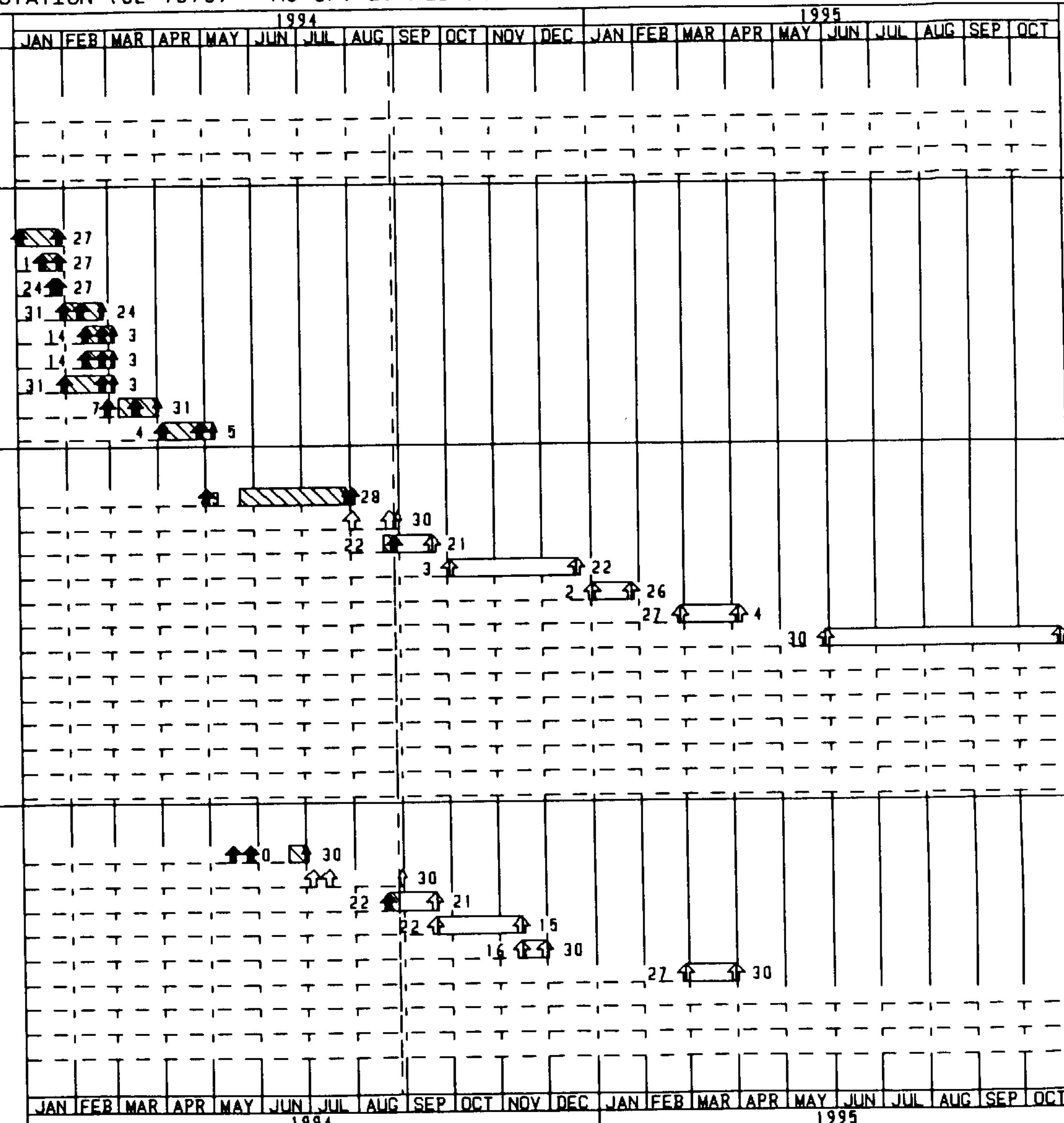
	Activity Code	Activity Description
		EOS GSE SOFTWARE - MODIFIED STE (52-1012)
454	D15550	FORMAL QUALIFICATION TESTING - STE
		EOS GSE SOFTWARE - SPACECRAFT CSTOL WORKSTATION (52-1013)
455	D15700	CYCLE 1 PLANNING - CSTOL WS (INCL TRIP/TRAINING)
456	D15750	CYCLE 2 MENU CONSTRUCTION - DETERMINE OBJECTIVES - CSTOL WS
457	D15800	CYCLE 2 MENU CONSTRUCTION - DETERMINE SUCCESS CRITERIA - CSTOLWS
458	D15850	CYCLE 2 MENU CONSTRUCTION - FORMULATE STRATEGY - CSTOL WS
459	D15900	CYCLE 2 MENU CONSTRUCTION - 1ST INTERNAL REVIEW - CSTOL WS
460	D16000	CYCLE 2 MENU CONSTRUCTION - DEV CODE - CSTOL WS
461	D16050	CYCLE 2 MENU CONSTRUCTION - VERIFY & VALIDATE CODE - CSTOL WS
462	D16100	CYCLE 2 MENU CONSTRUCTION - FINAL INTERNAL REVIEW - CSTOL WS
463	D16150	CYCLE 3 INPUT TABLE DESIGN - DETERMINE OBJECTIVES - CSTOL WS
464	D16200	CYCLE 3 INPUT TABLE DESIGN - DETERMINE SUCCESS CRITERIA - CSTOL WS
465	D16250	CYCLE 3 INPUT TABLE DESIGN - FORMULATE STRATEGY - CSTOL WS
466	D16300	CYCLE 3 INPUT TABLE DESIGN - 1ST INTERNAL REVIEW - CSTOL WS
467	D16350	CYCLE 3 INPUT TABLE DESIGN - DEVELOP CODE - CSTOL WS
468	D16400	CYCLE 3 INPUT TABLE DESIGN - VERIFY & VALIDATE CODE - CSTOL WS
469	D16450	CYCLE 3 INPUT TABLE DESIGN - FINAL INTERNAL REVIEW - CSTOL WS
470	D16470	CYCLE 4 PLANNING - INTEGRATION - CSTOL WS
471	D16490	RECEIVE OASIS/CSTOL FROM COLORADO UNIV - SCHEDULE TBD
472	D16500	CYCLE 4 INSTALL OASIS/CSTOL
473	D16550	CYCLE 5 INTEGRATION - DETERMINE OBJECTIVES - CSTOL WS
474	D16600	CYCLE 5 INTEGRATION - DETERMINE SUCCESS CRITERIA - CSTOL WS
475	D16650	CYCLE 5 INTEG - FORMULATE STRATEGY - CSTOL WS
476	D16700	CYCLE 5 INTEGRATION - PRE-CODE INTERNAL REVIEW - CSTOL WS
477	D16750	CYCLE 5 INTEGRATION - DEVELOP CODE - CSTOL WS
478	D16800	CYCLE 5 INTEGRATION - VERIFY & VALIDATE CODE - CSTOL WS



LRE Schedule	Critical Activity		1 Day Open/Complete	1 Day *CRITICAL*	Baseline Dates	EOS
Orig. Sched. Accompl'd	ID:202 Network:EOS	SEL: F1/1 NOT '1' AND F2/1 NOT 'L' AND F2/1 NOT 'M'		ORD: F2/12 AN	Actual - Planned	

Subassembly: EOS GSE SOFTWARE - SPACECRAFT CSTOL WORKSTATION (52-1013)   As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS GSE SOFTWARE - SPACECRAFT CSTOL WORKSTATION (52-1013)	
479	D16850	CYCLE 5 INTEGRATION - POST-CODE INTERNAL REVIEW - CSTOL WS	479
480	D16900	CYCLE 6 DRY RUN TESTING - CSTOL WS	480
481	D16950	FORMAL QUALIFICATION TESTING - CSTOL WS	481
		EOS GSE REQUIREMENTS & DESIGN CONCEPT DEVELOPMENT (74-1091)	
482	D17000	STE TECHNICAL REQUIREMENTS	482
483	D17050	CALIB EQUIP TECHNICAL REQUIREMENTS	483
484	D17100	MOUNTING TEMPLATE REQUIREMENTS	484
485	D17150	WORKSTATION REQUIREMENTS	485
486	D17200	HANDLING FIXTURE REQUIREMENTS	486
487	D17250	CALIB FIXTURE REQUIREMENTS	487
488	D17300	GSE DESIGN CONCEPT	488
489	D17350	GSE INTERNAL DESIGN REVIEW	489
490	D17400	GSE - PREP FOR & SUPPORT DCR	490
		EOS SPECIAL TEST EQUIPMENT (74-1011)	
491	D17500	STE PRELIMINARY DESIGN	491
492	D17550	STE INTERNAL DESIGN REVIEW	492
493	D17600	STE - PREP FOR & SUPPORT PDR	493
494	D17650	STE DETAILED DESIGN	494
495	D17700	STE FINAL INTERNAL DESIGN REVIEW	495
496	D17750	STE - PREP FOR & SUPPORT CDR	496
497	D17800	STE MATERIAL PROCUREMENT	497
498	D17850	STE FABRICATION	498
499	D17900	STE CABLE FABRICATION	499
500	D17950	STE ASSEMBLY & WIRING	500
501	D18000	STE INSPECTION	501
502	D18050	STE CHECK-OUT & SYSTEM TEST	502
503	D18100	STE TEST PROCEDURE REVISION	503
		EOS SPACECRAFT WORKSTATION (74-1012)	
504	D18200	S/C WORKSTATION PRELIMINARY DESIGN	504
505	D18250	S/C WS INTERNAL DESIGN REVIEW	505
506	D18300	S/C WS - PREP FOR & SUPPORT PDR	506
507	D18350	S/C WORKSTATION DETAILED DESIGN	507
508	D18400	S/C WS FINAL INTERNAL DESIGN REVIEW	508
509	D18450	S/C WS - PREP FOR & SUPPORT CDR	509
510	D18500	S/C WORKSTATION MATERIAL PROCUREMENT	510
511	D18550	S/C WS TEST PROCEDURES	511
512	D18600	CHECK-OUT S/C WORKSTATION	512



LRE Schedule
Orig. Sched. Accompl'd
Critical Activity
ID:202 Network:EOS
1 Day Open/Complete
SEL: F1/1 NOT 'I' AND F27/1 NOT 'L' AND F27/1 NOT 'M'
1 Day *CRITICAL*
ORD: F2/12 AN
Baseline Dates
Actual - Planned
EOS

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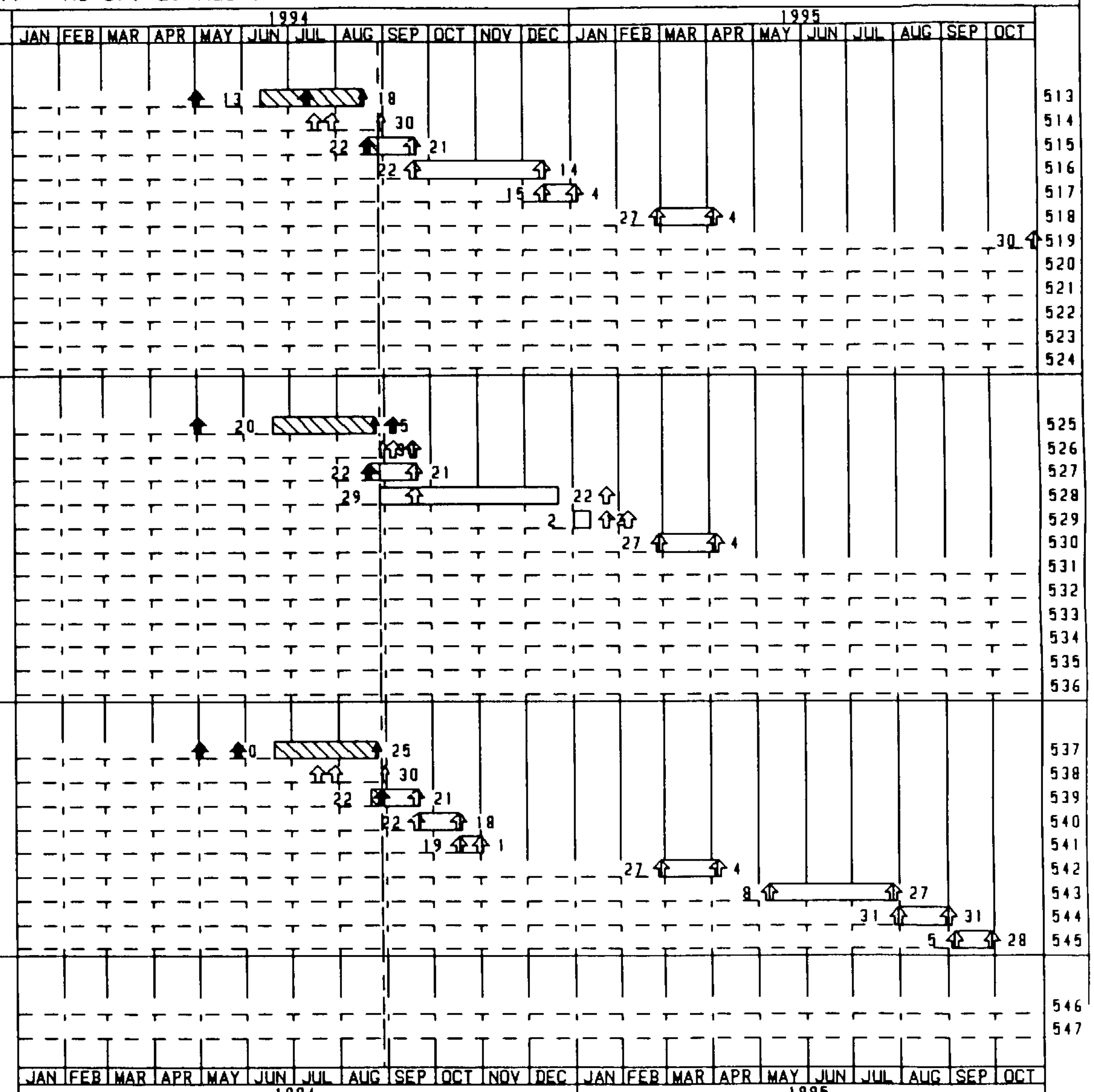
Subassembly: EOS INSTRUMENT HANDLING FIXTURES (74-1031) As Of: 29-AUG-94

	Activity Code	Activity Description
		EOS INSTRUMENT HANDLING FIXTURES (74-1031)
513	D18700	HANDLING FIXTURES PRELIMINARY DESIGN
514	D18750	HANDLING FIXT INTERNAL DESIGN REVIEW
515	D18800	HANDLING FIXT - PREP FOR & SUPPORT PDR
516	D18850	HANDLING FIXTURES DETAILED DESIGN
517	D18900	HANDLING FIXT FINAL INTERNAL DESIGN REVIEW
518	D18950	HANDLING FIXT - PREP FOR & SUPPORT CDR
519	D19000	HANDLING FIXT MATERIAL PROCUREMENT
520	D19050	HANDLING FIXT FABRICATION
521	D19100	HANDLING FIXTURES ASSEMBLY
522	D19150	HANDLING FIXT INSPECTION
523	D19200	HANDLING FIXT PROOF TEST
524	D19250	HANDLING FIXT PROOF TEST PROCEDURE REVISION
		EOS A1 CALIBRATION FIXTURE MODIFICATION (74-1032)
525	D19400	CALIB FIXTURE PRELIMINARY DESIGN
526	D19450	CALIB FIXT INTERNAL DESIGN REVIEW
527	D19500	CALIB FIXT - PREP FOR & SUPPORT PDR
528	D19550	CALIB FIXTURE DETAILED DESIGN
529	D19600	CALIB FIXT FINAL INTERNAL DESIGN REVIEW
530	D19650	CALIB FIXT - PREP FOR & SUPPORT CDR
531	D19700	CALIB FIXT MATERIAL PROCUREMENT
532	D19750	CALIB FIXT FABRICATION
533	D19800	CALIB FIXTURE ASSEMBLY
534	D19850	CALIB FIXT INSPECTION
535	D19900	CALIB FIXT TEST
536	D19950	CALIB FIXT TEST PROCEDURE REVISION
		EOS MOUNTING TEMPLATES (74-1033)
537	D20000	MOUNTING TEMPLATES PRELIMINARY DESIGN
538	D20050	MTG TEMP INTERNAL DESIGN REVIEW
539	D20100	MTG TEMP - PREP FOR & SUPPORT PDR
540	D20150	MOUNTING TEMPLATES DETAILED DESIGN
541	D20200	MTG TEMP FINAL INTERNAL DESIGN REVIEW
542	D20250	MTG TEMP - PREP FOR & SUPPORT CDR
543	D20300	MTG TEMP MATERIAL PROCUREMENT
544	D20350	MOUNTING TEMPLATES FABRICATION
545	D20400	MOUNTING TEMPLATES INSPECTION
		EOS SHIPPING/STORAGE CONTAINERS (74-1051)
546	D20500	SHIP/STORAGE CONTAINERS PROCUREMENT
547	D20550	SHIP/STORAGE CONTAINERS INSPECTION



LRE Schedule | Orig Sched. Accompl'd | Critical Activity | ID:202 Network:EDS | 1 Day Open/Complete | SEL: F1/1 NOT 'I' AND F2/1 NOT 'L' AND F2/1 NOT 'M' | 1 Day *CRITICAL* | ORD: F2/12 AN | Baseline Dates | Actual - Planned | EOS

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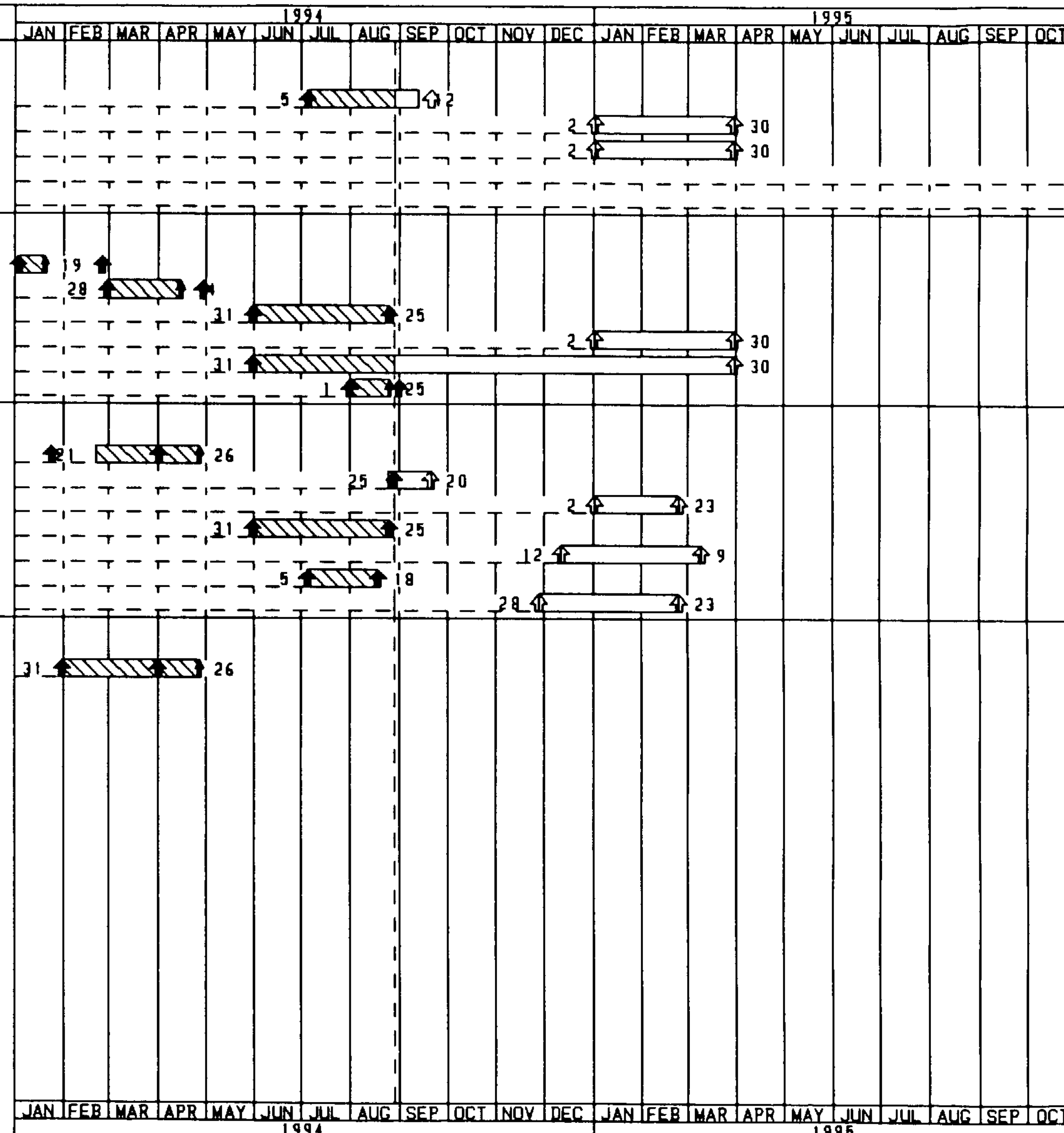
Subassembly:EOS DESIGN ASSURANCE - SYSTEM SAFETY (83-1110)   As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS DESIGN ASSURANCE - SYSTEM SAFETY (83-1110)	
548	D21000	PRELIMINARY HAZARD ANALYSIS - CDRL 106	548
549	D21050	FINAL HAZARD ANALYSIS - CDRL 106	549
550	D21100	SAFETY COMPLIANCE PACKAGE - CDRL 224	550
551	D21200	OPS HAZARD ANALYSIS - CDRL 107	551
552	D21300	LAUNCH COMPLEX SAFETY (ARAR) - CDRL 034	552
		EOS DESIGN ASSURANCE - PARTS CONTROL (83-1120)	
553	D21500	DPA PROCEDURE - CDRL 403	553
554	D21550	DERATING POLICY - CDRL 502	554
555	D21600	PRELIMINARY CRITICAL ITEM LIST - CDRL 507	555
556	D21650	FINAL CRITICAL ITEM LIST - CDRL 507	556
557	D21700	PARTS & DEVICES STRESS ANALYSIS - CDRL 109	557
558	D21710	DPA UPDATE - CDRL 403	558
		EOS DESIGN ASSURANCE - RELIABILITY (83-1140)	
559	D21750	DESIGN ASSURANCE PLAN	559
560	D21850	WORST CASE ANALYSIS 2 - CDRL 112	560
561	D21900	WORST CASE ANALYSIS 3 - CDRL 112	561
562	D21950	PRELIMINARY FMEA - CDRL 108	562
563	D22000	FINAL FMEA - CDRL 108	563
564	D22040	PRELIM RELIABILITY ASSESSMENT - MEMO	564
565	D22050	FINAL RELIABILITY ASSESSMENT - CDRL 110	565
		EOS QUALITY ASSURANCE (31-1150)	
566	D22200	QUALITY ASSURANCE PLAN UPDATE	566

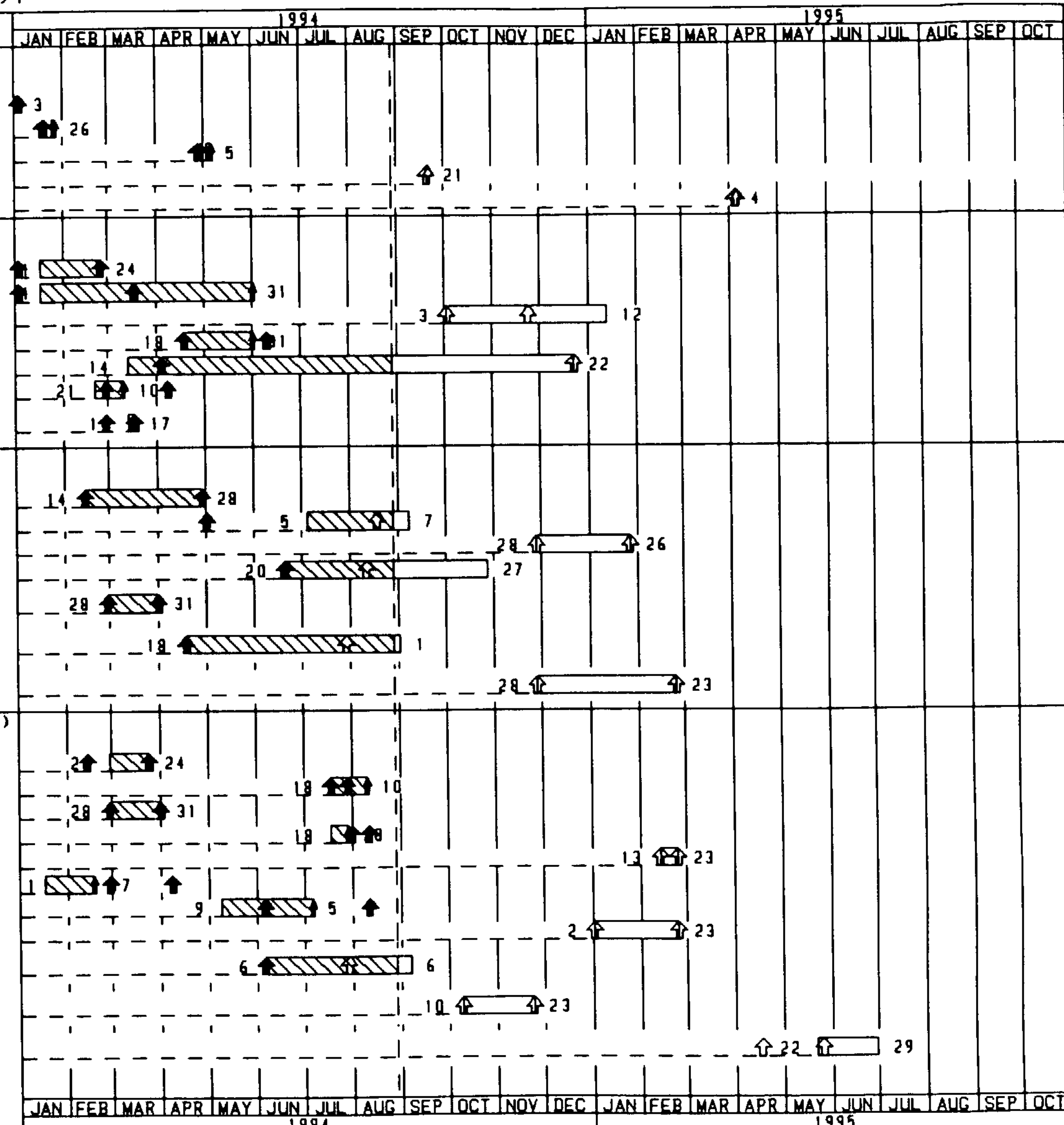


LRE Schedule	Critical Activity	1 Day Open/Complete	1 Day *CRITICAL*	Baseline Dates	EOS
Orig. Sched. Accompl'd	ID:202 Network:EOS	SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M'	ORD: F2/12 AN	Actual - Planned	

ARTEMIS   GENCORP AEROJET Electronic Systems Plant 29-AUG-94 11.27 am   Page 18 of 18

Subassembly: EOS/AMSU-A DESIGN PHASE As OF: 29-AUG-94

	Activity Code	Activity Description	
		EOS/AMSU-A DESIGN PHASE	
1	D05	START IMPLEMENTATION PHASE	1
2	D10	PROJECT INITIATION MEETING	2
3	D20	DCR - DESIGN CONCEPT REVIEW	3
4	D30	PDR - PRELIMINARY DESIGN REVIEW	4
5	D40	CDR - CRITICAL DESIGN REVIEW	5
		EOS SYSTEMS ENGR REQUIREMENTS REVIEW & FLOWDOWN (74-2110)	
6	D50	REVIEW & DOCUMENT SYSTEM REQTS- MATRICES	6
7	D100	REVIEW & DOCUMENT SUBSYSTEM REQTS	7
8	D110	UPDATE SUBSYSTEM SPECS	8
9	D120	REVIEW & DOCUMENT GSE REQUIREMENTS	9
10	D150	REVIEW & UPDATE COMPONENT SPECS & SOWS	10
11	D200	INITIAL SUBMITTAL - WEIGHT & POWER BUDGETS	11
12	D250	PREP PRELIM PREVIOUSLY DESIGNED HDWE REPORT- CDRL 201	12
		EOS SYSTEMS ENGINEERING SYSTEM DEFINITION (74-2120)	
13	D300	REVIEW & UPDATE SYSTEM ARCHITECTURE	13
14	D450	PRELIMINARY INTERNAL REVIEW OF SUBSYSTEM DESIGNS	14
15	D480	CRITICAL INTERNAL REVIEW OF SUBSYSTEM DESIGNS	15
16	D490	DEVELOP WORST CASE ANALYSIS (CDRL 112)	16
17	D500	DEVELOP RADIOMETRIC MATH MODEL (CDRL 101) - SCOPE	17
18	D550	DEVELOP RADIOMETRIC MATH MODEL (CDRL 101) - PRELIM	18
19	D560	DEVELOP RADIOMETRIC MATH MODEL (CDRL 101) - FINAL	19
		EOS SYSTEMS ENGINEERING SPACECRAFT INTERFACE DESIGN(74-2130)	
20	D650	PREP COMMAND LIST DESC DOC (CDRL 303) - PRELIM	20
21	D700	PREP COMMAND LIST DESC DOC (CDRL 303) - FINAL	21
22	D750	PREP ENG TELEMETRY DESC DOC - PRELIM	22
23	D800	PREP ENG TELEMETRY DESC DOC (CDRL 305) - FINAL	23
24	D820	PREP ENG TELEMETRY DESC DOC (CDRL 305) - UPDATE	24
25	D850	UPDATE INTERFACE DESC DOC - INPUT	25
26	D900	UPDATE INTERFACE DESC DOC (CDRL 519) - PRELIM	26
27	D920	UPDATE INTERFACE DESC DOC (CDRL 519) - FINAL	27
28	D925	PREP INTERFACE CONTROL DOC INPUT (CDRL516) - INITIAL	28
29	D930	PREP INTERFACE CONTROL DOC (CDRL 516) - 1ST UPDATE	29
30	D935	PREP INTERFACE CONTROL DOC INPUT (CDRL 516) - 2ND UPDATE(DELIVER TO NASA)	30



LRE Schedule
Orig. Sched. Accompl'd
Critical Activity
ID: 202 Network: EOS
1 Day Open/Complete
SEL: F1/1 NOT '1' AND F2/1 NOT 'L' AND F2/1 NOT 'M'
1 Day *CRITICAL*
ORD: F2/12 AN
Baseline Dates
Actual - Planned
EOS/

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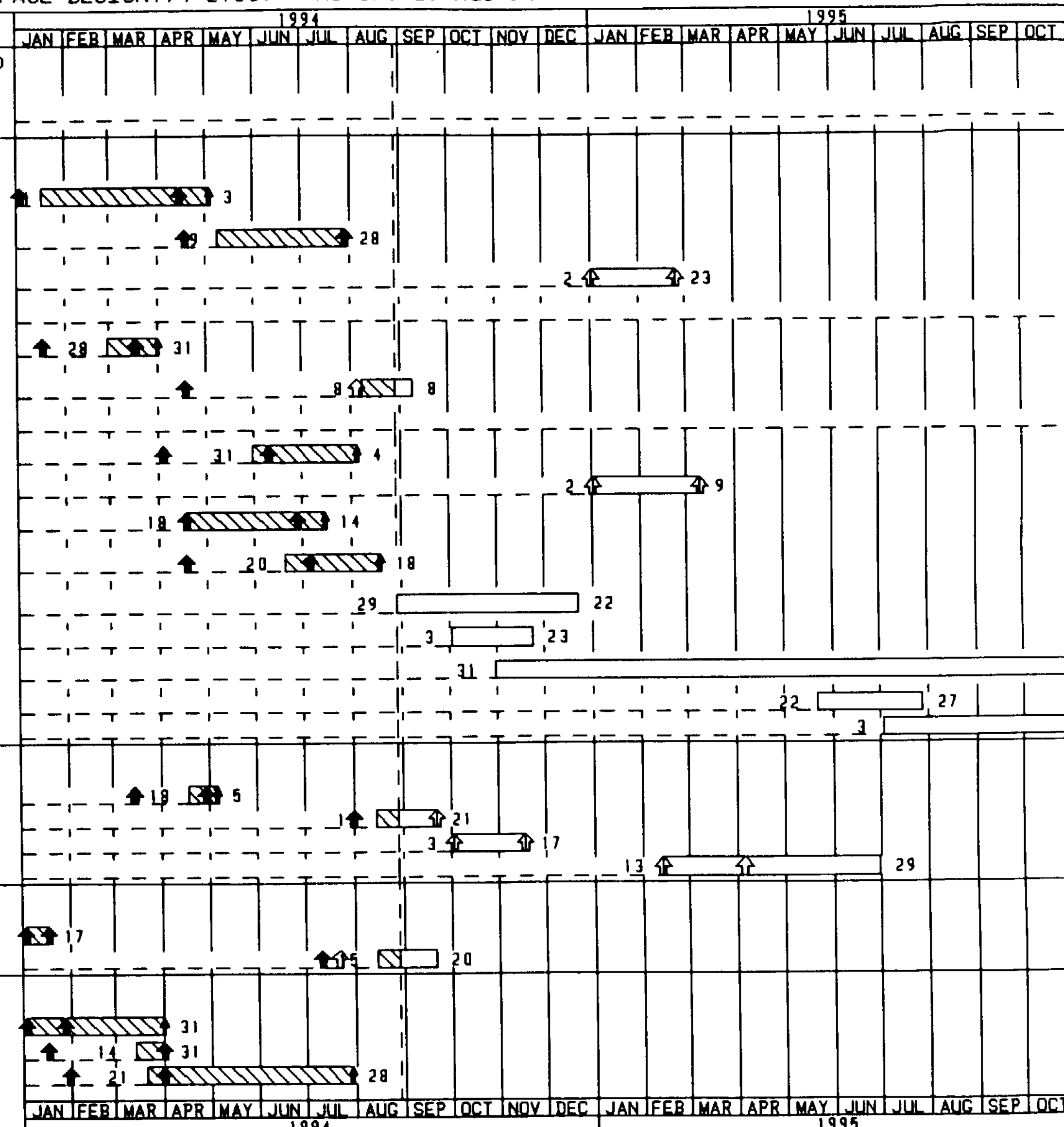
Subassembly: EOS SYSTEMS ENGINEERING SPACECRAFT INTERFACE DESIGN(74-2130)   As Of: 29-AUG-94

	Activity Code	Activity Description	
		EOS SYSTEMS ENGINEERING SPACECRAFT INTERFACE DESIGN(74-2130)	
31	D940	PREP INTERFACE CONTROL DOC INPUT (CDRL 516) - 3RD UPDATE(DELIVER TO NASA)	31
		EOS SYSTEMS ENGINEERING SYSTEM PLANS & PROCEDURES (74-2140)	
32	D950	PREP PERF VERIF PLAN (CDRL 022) & SPEC (CDRL 308) - PRELIM	32
33	D1000	PREP PERF VERIF PLAN (CDRL 022) & SPEC (CDRL 308) - PDR UPDATE	33
34	D1020	PREP PERF VERIFICATION PLAN (CDRL 022) & SPEC (CDRL 308) - FINAL	34
35	D1030	PREP PERF VERIFICATIONPROCEDURES (CDRL 412)	35
36	D1050	PREP CALIBRATION MANAGEMENT PLAN (CDRL 018) - PRELIM	36
37	D1100	PREP CALIBRATION MANAGEMENT PLAN (CDRL 018) - FINAL	37
38	D1120	PREP DETAILED GROUND CALIB PROCEDURES (CDRL 410)	38
39	D1150	PREP PRELIM OPERATIONAL IN-FLIGHT CHECKOUT PLAN (CDRL 025)	39
40	D1180	PREP FINAL OPERATIONAL IN-FLIGHT CHECK-OUT PLAN	40
41	D1200	PREP OPERATIONAL IN-FLIGHT CALIB PROCEDURE (CDRL 404) - PRELIM	41
42	D1250	PREP GEN. OPERATIONAL COMMAND PROCEDURE (CDRL 405) - PRELIM	42
43	D1260	PREP CONTROL OF UNSCHEDULED ACTIVITIES (CDRL 516)	43
44	D1270	PREPARE STORAGE PLANS (CDRL 24)	44
45	D1280	PREP TRANSPORTATION & HANDLING PROCEDURES (CDRL 406)	45
46	D1290	PREPARE ASSEMBLY PROCEDURES (CDRL 413)	46
47	D1295	PREP DETAILED TEST PROCEDURES (CDRL 409)	47
		EOS SYSTEMS ENGINEERING MEETING SUPPORT (74-2160)	
48	D1300	PREP FOR & SUPPORT DCR	48
49	D1350	PREP FOR & SUPPORT PDR	49
50	D1360	PREP FOR & SUPPORT CPR 1	50
51	D1380	PREP FOR & SUPPORT CDR	51
		EOS SPARES DEFINITION (74-1410)	
52	D1400	PREP SPARES PROGRAM PLAN (CDRL 035) - PRELIM	52
53	D1450	PREP SPARES PROGRAM PLAN (CDRL 035) - FINAL	53
		EOS RADIATION ANALYSIS (13-2121)	
54	D1500	PRELIM DATA BASE SEARCHES	54
55	D1550	PRELIM SHIELDING ANALYSIS/DESIGN CRITERIA MEMO	55
56	D1600	PRELIM PARTS ASSESSMENT & DCR SUPPORT	56



LRE Schedule | Critical Activity | 1 Day Open/Complete | 1 Day *CRITICAL* | Baseline Dates | EOS

Orig. Sched. Accompl'd | ID:202 Network:EOS | SEL: F1/I NOT 'I' AND F2/I NOT 'L' AND F2/I NOT 'M' | DRD: F2/12 AN | Actual - Planned

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APPENDIX B

ACTION ITEM RESPONSES

ATTACHMENT 1

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-1

ACTION REQUESTED:

Spacecraft System Concept Review is planned for end of 1995. Aerojet should aim to start working ICD issues with spacecraft contractor starting two months after the scheduled award date of July '95. Final ICDs should be available at the SCR. Put this in ARTEMIS/PMS planning.

RESPONSE:

Compliance with this action item has been accomplished by shifting a milestone date of task 01 of account 4170-74-2130 from June '95 to Dec '95 in the PMS and by shifting milestones of ICD submittals in task 04 of account 4170-74-2130. (See also Action Item No. 7/26-3.) PMS has been updated, and ARTEMIS will reflect this update in the next revision.

for [signature]
Weldon Chapman, EOS/AMSU-A
Systems Engineering Product
Team Leader

8/11/94
Date

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-3

ACTION REQESTED:

System engineering schedule status (page 33). Add updates to ICD plan to post-PDR, post-CDR (if required) and the August-December '95 time frame for coordination with the spacecraft contractor (see AI 7/26-1) above).

RESPONSE:

Compliance with this action item has been accomplished by shifting a milestone date of task 01 of account 4170-74-2130 from June '95 to Dec '95 in the PMS and by shifting milestones of ICD submittals in task 04 of account 4170-74-2130. (See also Action Item No. 7.26-1.) PMS has been updated, and ARTEMIS wil reflect this update in the next revision.

for [signature]
Weldon Chapman, EOS/AMSU-A
Systems Engineering Product
Team Leader

8/11/94
Date

ACTION ITEM RESPONSE

ACTION ITEM NO: 7/26-4

ACTION REQUESTED:

Provide data for COI bond line stress levels for launch loads.

RESPONSE:

COI has responded with Attachment 1 that gives the maximum stress of 30 psi. The 90 g load is the qualification load that was derived by Aerojet from NOAA A2 random vibration test measurements. It is the equivalent to the worst case launch loading environment.

It should be noted that this is very preliminary information. A final vendor for the A2 composite reflector has yet to be chosen.

Wayne Ely, Team Leader
Mechanical/Thermal Subsystem

COMPOSITE OPTICS, INC.

Attachment 1

EOS/AMSU-A A2 Reflector Assembly
Preliminary Fitting Bond Analysis

- From COI Proposal #PL-1213, Figure 2.2.2.1 the approximate fitting to parabolic shell bond area = 2.6 in^2
- Per section 2.3.2 the weight of the assembly (not including fitting) is .87 lb.
- Per Aerojet assembly must withstand 90G loading
  - Fitting Bond must react (90 G)(.87 lb) = 78.3 lb
  - As worst case assume load is normal to bond, resulting in bond tension.
  - Bond stress = $\frac{P}{A} = \frac{78.3^{\#}}{2.6 \, in^2} = \underline{30 \text{ psi}}$
  - Typical Bond allowable is 1000 psi
  - Margin (with SF of 1.5) = $\frac{1000}{(1.5)(30)} - 1 = \underline{\underline{21}}$ ✓

PREPARED BY C. Sloan	DATE 8/23/94	REVISED BY	DATE	CHECKED BY	DATE

ATTACHMENT #3

August 9, 1994

FED XPRESSED
TO M. DONAW 8/10/94

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-7

DESCRIPTION: Provide NASA a copy of the A2 reflector specification including envelope drawing.

RESPONSE: A copy of the A-2 Reflector Assembly Specification (AE-26582) and envelope drawing (dwg. #1355835) are enclosed.

8/10/94

D. W. Howell — Date
Program Manager
EOS/AMSU-A Program

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-10

ACTION REQUESTED:

Antenna motor bearings - define what is meant by "bake-out" on page 92

RESPONSE:

The reference to bake out is made regarding the bearing cleaning and lubrication process as specified in Aerojet specification No. AE-26060, entitled "Inspection, Cleaning, and Lubrication Procedures for Ball Bearings and Lubricant Reservoirs - AMSU-A." (This specification has been provided to the EOS/AMSU-A Technical Officer.)

There are numerous bake-out procedures specified in the specification for both cleaning and lubrication of bearing parts. The significant ones regarding outgassing are administered after introduction of the lubricant. Four such procedures were identified.

Three different bake-out procedures are specified for vacuum impregnation of the Apiezon C lubricant into various porous parts used in the assembly: machinable, microporous elastomer and polyimid materials and phenolic retainers. These processes generally call for oil impregnation at 10^{-4} torr and 150°F (65.6°C) and maintainance of these conditions for one hour after impregnation (see AE-26060 for details).

The final bake-out procedure involves the completed bearing assembly, already containing lubricant-impregnated parts. The assembly is immersed in the lubricant at conditions of 10^{-4} torr and 150°F and maintained for two hours. The vacuum is then broken and the lubricated bearings maintained at 150°F for six days.

Specification AE-26060 was prepared for the NOAA/AMSU-A program to ensure clean and well-lubricated bearings. The bake-outs were intended for this purpose and not as an outgassing procedure. The specification will be reviewed to see if it can be appropriately modified to include bake-outs for outgassing elimination after results by GSFC regarding the Apiezon C sample outgassing characteristics are obtained

For [signature]
Weldon Chapman, EOS/AMSU-A
Systems Engineering Product
Team Leader

8/9/94
Date

Harold Cover
Harold Cover, EOS/AMSU-A
Contamination, Materials, and
Processes Team Leader

8/9/94
Date

ACTION ITEM RESPONSE

ATTACHMENT 4

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-18

ACTION REQESTED:

Provide radiation study/analysis that established EOS requirements and how these requirements are to be met. If shielding is to be used provide type, size thickness, etc. of shielding. Explain how the radiation requirements of the GIRD and PAR were/are met. (Also see AI 7/26-9.)

RESPONSE:

The radiation study/analysis that established EOS requirements is documented in the attached memo by Jim Parkinson. It has been reviewed, and no update is required. A conference call will be scheduled between Jim Parkinson and Bob Shelley/Mark Domen after this memo submittal is reviewed. (See Action Item 7/26-9.) Close out of this action item will be accomplished at PDR.

for Weldon Chapman, EOS/AMSU-A
Systems Engineering Product
Team Leader

8/11/94
Date

Radiation Survivability Guide and Specification
(EOS/AMSU)

All subsystems must be capable of surviving five years in a 705-Km circular near-polar (i = 98°) orbit.

Electronic devices in ceramic flatpacks or standard kovar cans which are survivable to 10^5Krad(Si) total dose, and are not subject to single-event phenomena, may be used in this program without special shielding. Otherwise, see below.

Total Dose

The doses which may be expected under various conditions of shielding are as given below:

Condition	Exposure	Total Dose (5-years)	Dose with x2 Margin
A.	Satellite surface materials	$\sim 10^4$ Krad	$\sim 2\times10^4$Krad
B.	Si chip in 0.22gm/cm^2 package	50 Krad	100 Krad
C.	Si chip within instrument structure	27 Krad	54 Krad
D.	Si chip in package and structure	16 Krad	31 Krad
E.	Si chip in package, 60 mil Aℓ box, structure	6 Krad	12 Krad
F.	Si chip behind heavy shielding	~2 Krad	~5 Krad

A design margin of x10 is desired, and x2 is absolutely required. (Definitive radiation data is required for use of a design margin as low as 2.)

Many power transistors and integrated circuits are not reliably survivable to 270 Krad, or even to 54 Krad. Therefore, the subcontractor may prefer to take advantage of the box structure around the electronics (as measured by the thinnest shielding in each direction; i.e., a 100-mil wall hogged out to 40-mils over 40% of its area nevertheless provides only 40-mils of effective shielding).

If the subcontractor's box walls are aluminum and provide a minimum of "x" thickness ("ρx" gm/cm^2 areal density), then the 5-year dose inside the box will be approximately

$$D=\frac{27}{\left[1+\frac{x}{x_o}\right]^{1.5}}=\frac{27}{\left[1+\frac{\rho x}{\rho x_o}\right]^{1.5}}\; Krad(Si) \qquad (1)$$

where ρx_o = 0.35gm/cm^2, or x_o = 51 mil. (Beyond 1.7gm/cm^2 the dose is only proportional to x^{-1}.)

If another material is substituted for aluminum, it may not be equally effective. For elements of atomic number $z \leq 14$ (e.g., silicon, magnesium, alumina, glass, and most organics), they may be substituted as gm/cm^2 on a one-for-one basis. (E.g., 0.15cm of $\rho = 2.7 gm/cm^3$ $A\ell$ is equivalent to 0.2334 cm of $\rho = 1.74 gm/cm^3$ Mg; both have $\rho = 0.405 gm/cm^2$ areal density.) For heavier elements ($z > 14$) the effective areal density must be reduced by a factor of $[(z+3)/16]^{-0.34}$. E.g., 0.1cm of $\rho = 8.96 gm/cm^3$ copper is equivalent to aluminum of

$$\rho x|_{A\ell} = 0.1(8.96)\left[(29+3)/16\right]^{-0.34} = 0.708 gm/cm^2 (= 0.26 cm\, A\ell) \qquad (2)$$

which means copper is 21% less efficient than the same weight aluminum. [Nevertheless, 0.1cm of copper is 62% thinner than the equivalent aluminum.]

Protons

Although the ionizing effects of solar and trapped protons are included in total dose (above), protons and heavier ions also produce displacement damage. Proton fluxes are expected in the range 10^{10}-10^{11} ρ/cm^2. Survivability of an electronic part to $10^{12} n/cm^2$ may be considered adequate evidence of survivability against protons.

Single Event Phenomena (Transient and Permanent Upsets, Latchup, Burnout)

Single-event cross sections are measured in cm^2/particle for a given dE/dx, called linear energy transfer ("LET") in MeV-cm^2 /mg. The mean long-term-averaged cosmic-ray particle rate may be approximated as

$$\phi \approx 50 / LET^{2.5} \ particle / cm^2\text{-}day \qquad (3a)$$
$$(LET < 25 MeV - cm^2 / gm)$$

and

$$\phi \approx 0.02 / (LET / 20)^{8} \ particle / cm^2\text{-}day \qquad (3b)$$
$$(LET > 20 MeV - cm^2 / gm)$$

Single-event upset (SEU) rates will usually be acceptable if the device cross section is $\leq 10^{-8} cm^2$/particle, or $< 10^{-6}$ error/device-day (error/bit-day in ROMS and RAMS must be much smaller to keep the per-device error rate negligible).

Occurrence of single-event latchup (SEL) is an indication not to use the device. (In an extreme case of no alternative part, a latchup-detect/reset circuit would need to be provided. If such a part is contemplated, the prime contractor [Aerojet] should be notified immediately.)

Single-event burnout (SEB) may be a problem in some power transistors, including bipolar power transistors. SEB is not permissible. (It may usually be avoided by designing with voltages ≤75% of the breakdown voltage, or ≤25% for Darlington pairs.)

Shortfalls

The subcontractor shall furnish Aerojet a list of the electronic parts to be used, or contemplated to be used. The list shall consist of three categories: [1] Parts which are adequately survivable (furnish survivability levels for each), [2] Parts with design margins between x2 and x10, and [3] Parts with incompletely-known survivability. Parts sensitive to ≤5 Krads should not be used. [The subcontractor may ask Aerojet assistance for survivability information.]

August 10, 1994

FAXED TO M. Domen 8/10/94

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-21

DESCRIPTION:

Provide list of schedule "Critical" parts and materials ASAP for expediting by GSFC. Submit NSPARs at least 30 days prior to procurement date.

Background: The intent of this action item was to identify which NSPARs need GSFC review on a priority basis.

RESPONSE:

The most "critical" parts are those used in the following components/subassemblies:

ITEM	COMPONENT	SUPPLIER
1.	VCGDO	Litton
2.	TCXO	FEI
3.	DC/DC Converter	TBD
4.	1553 Microcircuit	DDC
5.	DRO	Litton
6.	Saw Filter	Phonon
7.	Mixer/Amplifiers	Spacek
8.	IF Amplifiers	Amplica
9.	Motors	Magtech (Vernitron)

Items 1, 2 and 3 on the above list are new components and/or new vendors and data is not yet available for Aerojet or NASA review. However, when available, this data will be expeditiously submitted and should receive priority review.

Item 4, the 1553 microcircuit is also new, but the GSFC FAM (R. Shelley) participated in July 28, 1994 supplier discussions regarding these parts and is already working the associated issues. A specification has been drafted and after input into the proper format, a copy will be submitted for Mr. Shelley's review and comment.

Based on the above, the NSPARs that currently need priority attention are those listed in the EOS/AMSU subcontractor Preliminary Parts List* under the (hereto attached) sections for Litton, Spacek, Amplica and Magtech. Phonon is not included because no NSPARs were generated for Phonon on NOAA. Please note the NSPAR numbers which have been circled on the attached sections are the NOAA-generated NSPARs which are not required on EOS because the parts are Grade 1 or 2 and listed in either PPL 20 or MIL-STD-975, and therefore review/approval by GSFC is not necessary.

*The EOS/AMSU subcontractor Preliminary Parts List is based on the NOAA/AMSU-A PDIL.

Emil Lorenz 8/10/94
Emil Lorenz Date

EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

LITTON

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR, GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
CABLE,RF,COAX,.085 SEMIRIGID	1205665	1205665		M17/133-RG405	1	L157	APPROV		
CABLE,RF,COAX,.141 SEMIRIGID	1205571	1205571		M17/130-RG402	1	L155	CANCEL		
CONNECTOR,RIGHT ANGLE,SMA	1205381	1205381			1	L152	APPROV		
Connector,SMA Plug	2248	2248		M39012/60-3002	1	L165	APPROV		
CONNECTOR,SMA PLUG,SEMIRIGID	1205570	1205570		M39012/79-3102	1	L154	CANCEL		
CONNECTOR,SMA PLUG,SEMIRIGID	1205655	1205655		M39012/79-3001	1	L158	APPROV		
DIODE,RECTIFIER,SCHOTTKY	1205363-00	1205363			1	L144	APPROV		
DIODE,VARACTOR,GaAs MULT.	30059	30059			1	L151B	APPROV		
DIODE,ZENER	1205373-04,-05,-06	1205373			1	L148	APPROV		
DRO FINAL ASSEMBLY	1205581-01 THRU -05	1205581			1	L156	APPROV		
FILTER,EMI,HERMETIC SEAL	1200512	1200512		M28861/05-006TB	1	L153	APPROV		
INDUCTOR	1205397	1205397			1	L149A	APPROV		
LOW,PASS EMI FILTER FEEDTHRU	30060	30060			1	L150	CANCEL		
MCKT.,REG.,ADUSTABLE,1A	1205364-00	1205364			1	L147A	APPROV		
MCKT.,REG.,SWITCHING,1.25A	1205357-01	1205357			1	L141	CANCEL		
MCKT.,REG.,SWITCHING,2.5A	1205358-01	1205358			1	L142	CANCEL		
MCKT.,REG.,SWITCHING,5.0A	1205359-01	1205359			1	L143B	APPROV		
RF ISOLATOR	1205334-01 THRU -05	1205334			1	L146	APPROV		
VARACTOR TRIPLER	1205333-01 THRU -05	1205333			1	L145	CANCEL		

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EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

SPACEK

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR, GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
CAPACITOR,CHIP	200A103NP50	30021	ATC			SP084-01B	CONCUR	A	8847
CAPACITOR,CHIP	200A502NP50	30021	ATC			SP084-02B	CONCUR	A	8913
CAPACITOR,CHIP	200B104NP50	30021	ATC			SP084-03B	CONCUR	A	8847
CAPACITOR,CHIP	CDR12BG150AJUM	MIL-C-55681/4	ATC	100A150JPH		SP085-01B	CONCUR	N/R	8810
CAPACITOR,CHIP	CDR12BG1R0ACUM	MIL-C-55681/4	ATC	100A1R0CPH		SP085-02B	CONCUR	N/R	8906
CAPACITOR,CHIP	CDR12BG1R8ACUM	MIL-C-55681/4	ATC	100A1R8CPH		SP085-03B	CONCUR	N/R	8828
CAPACITOR,CHIP	CDR12BG2R2ACUM	MIL-C-55681/4	ATC	100A2R2CPH		SP085-04B	CONCUR	N/R	8821
CAPACITOR,CHIP	CDR12BG2R4ACUM	MIL-C-55681/4	ATC	100A2R4CPH		SP085-05B	CONCUR	N/R	8832
CAPACITOR,CHIP	CDR12BG2R4ACUM	MIL-C-55681/4	ATC	100A2R4CPH		SP085-05B	CONCUR	N/R	8840
CAPACITOR,CHIP	CDR12BG2R7ACUM	MIL-C-55681/4	ATC	100A2R7CPH		SP085-06B	CONCUR	N/R	8750
CAPACITOR,CHIP	CDR12BG2R7ACUM	MIL-C-55681/4	ATC	100A2R7CPH		SP085-06B	CONCUR	N/R	8815
CAPACITOR,CHIP	CDR12BG3R3ACUM	MIL-C-55681/4	ATC	100A3R3CPH		SP085-07B	CONCUR	N/R	8750
CAPACITOR,CHIP	CDR12BG510AJUM	MIL-C-55681/4	ATC	100A510JPH		SP085-08B	CONCUR	N/R	8836
CAPACITOR,CHIP	CDR12BG560AJUM	MIL-C-55681/4	ATC	100A560JPH		SP085-09B	CONCUR	N/R	8819
CAPACITOR,CHIP	CDR12BG6R2ACUS	MIL-C-55681/4	ATC	100A6R2CPH		SP085-11B	CONCUR	N/R	8823
CAPACITOR,CHIP	CDR12BG8R2AJUM	MIL-C-55681/4	ATC	100A8R2JPH		SP085-10B	CONCUR	N/R	8828
CONNECTOR,SMA	2052-3357-02		OMNI-SPECTRA		1	SP119	CONCUR	A	8938
DIODE	JANS1N647-1	MIL-S-19500/240	MICROSEMI	1N647-1	1	STD	N/R	N/A	8752
DIODE,SCHOTTKY,MIXER	MD915	30008	T.I.	MD654	2	SP100	CONCUR	A	A8906
DIODE,SCHOTTKY,MIXER	MD915	30008	T.I.	MD654	2	SP100	CONCUR	A	A8840
FILTER,FEED-THRU	M15733/44-0002	MIL-F-15733/44	MURATA ERIE	1250-063	1	SP083C	CONCUR	A	8810A
HYBRID,AMPLIFIER	30018-1	30018	COUGAR COMP.	AC457A (-1 TO -9)	1	SP104-01B	CONCUR	A/P	8923
HYBRID,AMPLIFIER	30018-2	30018	COUGAR COMP.	AC434-4A (-1 TO -9)	1	SP104-02B	CONCUR	A	8923
HYBRID,RF AMPLIFIER	A29-2P	30019	WJ	A28-2 (-10)	3	SP080A	CONCUR	A/P	8846
RESISTOR,CHIP	M55342K06R150JS	MIL-R-55342/6	STATE OF THE ART	RM0705		SP086-01	CONCUR	A	8728

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EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

SPACEK

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR,GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
RESISTOR,CHIP	M55342K06R220JS	MIL-R-55342/6	STATE OF THE ART	RM0705		SP086-02	CONCUR	A	8923
RESISTOR,CHIP	M55342K06R330JS	MIL-R-55342/6	STATE OF THE ART	RM0705		SP086-03	CONCUR	A	8831
RESISTOR,CHIP	M55342K06R3K30S	MIL-R-55342/6	STATE OF THE ART	RM0705		SP086-04	CONCUR	A	8828
RESISTOR,CHIP	M55342K06R6K80S	MIL-R-55342/6	STATE OF THE ART	RM0705		SP086-05	CONCUR	A	8820
RESISTOR,COMPOSITION	RCR05G100JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8809
RESISTOR,COMPOSITION	RCR05G101JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8816
RESISTOR,COMPOSITION	RCR05G102JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8814
RESISTOR,COMPOSITION	RCR05G120JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8815
RESISTOR,COMPOSITION	RCR05G131JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8803
RESISTOR,COMPOSITION	RCR05G132JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8818
RESISTOR,COMPOSITION	RCR05G150JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8707
RESISTOR,COMPOSITION	RCR05G151JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8829
RESISTOR,COMPOSITION	RCR05G152JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8820
RESISTOR,COMPOSITION	RCR05G161JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8810
RESISTOR,COMPOSITION	RCR05G180JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8837
RESISTOR,COMPOSITION	RCR05G181JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8818
RESISTOR,COMPOSITION	RCR05G182JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8832
RESISTOR,COMPOSITION	RCR05G201JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8840
RESISTOR,COMPOSITION	RCR05G202JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8824
RESISTOR,COMPOSITION	RCR05G221JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8828
RESISTOR,COMPOSITION	RCR05G240JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8840
RESISTOR,COMPOSITION	RCR05G270JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8829
RESISTOR,COMPOSITION	RCR05G271JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8720
RESISTOR,COMPOSITION	RCR05G300JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8813
RESISTOR,COMPOSITION	RCR05G301JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8830
RESISTOR,COMPOSITION	RCR05G330JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8813
RESISTOR,COMPOSITION	RCR05G331JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8831

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EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

SPACEK

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR,GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
RESISTOR,COMPOSITION	RCR05G361JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8811
RESISTOR,COMPOSITION	RCR05G390JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8832
RESISTOR,COMPOSITION	RCR05G391JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8812
RESISTOR,COMPOSITION	RCR05G471JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8816
RESISTOR,COMPOSITION	RCR05G510JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8829
RESISTOR,COMPOSITION	RCR05G511JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8829
RESISTOR,COMPOSITION	RCR05G560JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G561JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8817
RESISTOR,COMPOSITION	RCR05G5R6JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8823
RESISTOR,COMPOSITION	RCR05G680JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8839
RESISTOR,COMPOSITION	RCR05G681JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8817
RESISTOR,COMPOSITION	RCR05G750JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8813
RESISTOR,COMPOSITION	RCR05G751JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8832
RESISTOR,COMPOSITION	RCR05G820JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8806
RESISTOR,COMPOSITION	RCR05G8R2JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8821
RESISTOR,COMPOSITION	RCR05G910JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8822
RESISTOR,COMPOSITION	RCR05G9R1JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	8819
TRANSISTOR,NPN	30020-1	30020	NEC	NE64508(B)	1	SP105-01B	CONCUR	A	8841
TRANSISTOR,NPN	30020-2	30020	NEC	NE02107E(B)(-1to-9)	1	SP105-02B	CONCUR	A	8839

DPA STATUS CODE: A=ACCEPTABLE, I=IN REVIEW, R=PARTS/LOT REJECTED,
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N/A=NOT APPLICABLE, N/R=NOT REQUIRED

EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

AMPLICA

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR, GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
CAPACITOR,CHIP	76131-102	76131	AVX	CDR01BX102BKMS		STD	N/R	A	8919
CAPACITOR,CHIP	76131-472	76131	AVX	CDR01BX472AKMS		STD	N/R	A	8913
CAPACITOR,CHIP	76131-560	76131	AVX	CDR01BX560BJMS		STD	N/R	A	8925
CAPACITOR,CHIP	76132-0R5	76132	AVX	CDR12BG0R5ABUR		STD	N/R	A	8914
CAPACITOR,CHIP	76132-130	76132	AVX	CDR12BG130AFUR		STD	N/R	A	8840
CAPACITOR,CHIP	76132-150	76132	AVX	CDR12BG150AFUR		STD	N/R	A	8848
CAPACITOR,CHIP	76132-160	76132	AVX	CDR12BG160AFUR		STD	N/R	A	8908
CAPACITOR,CHIP	76132-1R5	76132	AVX	CDR12BG1R5ABUR		STD	N/R	A	8817
CAPACITOR,CHIP	76132-1R8	76132	AVX	CDR12BG1R8ABUR		STD	N/R	A	8749
CAPACITOR,CHIP	76132-200	76132	AVX	CDR12BG200AFUR		STD	N/R	A	8830
CAPACITOR,CHIP	76132-2R4	76132	AVX	CDR12BG2R4ABUR		STD	N/R	A	8751
CAPACITOR,CHIP	76132-300	76132	AVX	CDR12BG300AFUR		STD	N/R	A	8914
CAPACITOR,CHIP	76132-4R3	76132	AVX	CDR12BG4R3ABUR		STD	N/R	A	8901
CAPACITOR,CHIP	76132-4R7	76132	AVX	CDR12BG4R7ABUR		STD	N/R	A	8749
CAPACITOR,CHIP	76132-5R1	76132	AVX	CDR12BG5R1ABUR		STD	N/R	A	8903
CAPACITOR,CHIP	76132-5R6	76132	AVX	CDR12BG5R6ABUR		STD	N/R	A	8748
CAPACITOR,CHIP	76132-6R2	76132	AVX	CDR12BG6R2ABUR		STD	N/R	A	8813
CAPACITOR,CHIP	76132-7R5	76132	AVX	CDR12BG7R5ABUR		STD	N/R	R	8806
CAPACITOR,CHIP	76132-7R5	76132	AVX	CDR12BG7R5ABUR		STD	N/R	A	8906
CAPACITOR,CHIP	76132-8R2	76132	AVX	CDR12BG8R2ABUR		STD	N/R	A	8803
CAPACITOR,CHIP	76132-9R1	76132	AVX	CDR12BG9R1ABUR		STD	N/R	A	8907
CONNECTOR,SMA	600210	600210	OMNI-SPECTRA	2058-5029-00		AM131	CONCUR	A	8808
CONNECTOR,SMA	600210	600210	OMNI-SPECTRA	2058-5029-00		AM131	CONCUR	A	8817
DIODE	76141	76141	MOTOROLA	1N4625		AM111	CONCUR	A	8739
DIODE	JANS1N5415	MIL-S-19500/411	QPL	1N5415		STD	N/R	N/A	

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N/A=NOT APPLICABLE, N/R=NOT REQUIRED

EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

AMPLICA

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR, GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
FILTER	M15733/61-0008	MIL-F-15733/61	SPECTRUM CONTROLS	420066		AM127	CONCUR	A	8814
INDUCTOR	7981-20	7981	QPL			STD	N/R	N/A	
INDUCTOR	7981-40	7981	QPL			STD	N/R	N/A	
INDUCTOR	7981-50	7981	QPL			STD	N/R	N/A	
INDUCTOR	7981-55	7981	QPL			STD	N/R	N/A	
INDUCTOR	7985-20	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-25	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-30	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-35	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-40	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-50	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-80	7985	QPL			STD	N/R	N/A	
INDUCTOR	7985-90	7985	QPL			STD	N/R	N/A	
INDUCTOR	M39010/08B1R0KS	MIL-I-39010/8		500088		AM118-01	CONCUR	N/A	
INDUCTOR	M39010/08BR10KS	MIL-I-39010/8		500087		AM118-02	CONCUR	N/A	
INDUCTOR	M39010/09A100KS	MIL-I-39010/9		500089		AM117	CONCUR	N/A	
MCKT., OP-AMP	76137	76137	FAIRCHILD	M38510/11905BPA		AM109A	CONCUR	A	8807
RESISTOR, CHIP	M55342M02R10J0M	MIL-R-55342/2		RM0505		AM130-01	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R10K0R	MIL-R-55342/2		RM0505		AM130-02	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R120JM	MIL-R-55342/2		RM0505		AM130-03	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R150JM	MIL-R-55342/2		RM0505		AM130-04	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R1K00M	MIL-R-55342/2		RM0505		AM130-05	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R1K00R	MIL-R-55342/2		RM0505		AM130-06	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R1K00R	MIL-R-55342/2		RM0505		AM130-07	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R200JM	MIL-R-55342/2		RM0505		AM130-08	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R2K00M	MIL-R-55342/2		RM0505		AM130-09	CONCUR	N/A	
RESISTOR, CHIP	M55342M02R390JM	MIL-R-55342/2		RM0505		AM130-10	CONCUR	N/A	

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EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

AMPLICA

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR, GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
RESISTOR,CHIP	M55342M02R51JOR	MIL-R-55342/2		RM0505		AM130-11	CONCUR	N/A	
RESISTOR,CHIP	M55342M02R56JOM	MIL-R-55342/2		RM0505		AM130-12	CONCUR	N/A	
RESISTOR,CHIP	M55342M06R33JOM	MIL-R-55342/6		RM0705		SP086-06	CONCUR	N/A	
RESISTOR,COMPOSITION	RCR05G101JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G102JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G121JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G131JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G133JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G151JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G241JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G301JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G302JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G331JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G363JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G431JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G511JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G561JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G620JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
RESISTOR,COMPOSITION	RCR05G682JS	MIL-R-39008/4	A-B	RCR05		STD	N/R	N/A	
TRANSISTOR	320256	MIL-S-19500/291	QPL	2N2907A		STD	N/R	N/A	
TRANSISTOR	76140	76140	NEC	NE64508(B)		AM110A	CONCUR	A	8706
TRANSISTOR,FET	7541	7541	MITSUBISHI	MGF1412-29		AM106A	CONCUR	A/S	75AA
TRANSISTOR,FET	7543	7543	MITSUBISHI	MGF1801-33		AM107A	CONCUR	A	89MA

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EOS/AMSU SUBCONTRACTOR PRELIMINARY PARTS LIST

MAGTECH

PART DESCRIPTION	PART NUMBER	SPECIFICATION NUMBER	MANUFACTURER	VENDOR, GENERIC OR MIL-SPEC PART NUMBER	QTY PER SYS	NSPAR NUMBER	GSFC NSPAR STATUS	DPA STATUS	DATE CODE
MCKT.,HALL EFFECT SENSOR	25012/16-1	25012/16	SPRAGUE	UGS-3140HH	4	MT027B	CONCUR	R	9049D
MCKT.,HALL EFFECT SENSOR	25012/16-1	25012/16	SPRAGUE	UGS-3140HH	4	MT027B	CONCUR	A/P	8926B

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August 22, 1994

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/26-24

DESCRIPTION:

Provide impact assessment of updated NSPARs submittal criteria.

BACKGROUND

Since many of the parts will be the same, the preliminary parts list submitted for EOS was based largely on the latest PDIL for NOAA. It was also submitted with the negotiated understanding that all of the approved NOAA NSPARs would be acceptable on EOS. However, the effect of changes in part selection requirements is that some parts which required NSPARs on NOAA will not on EOS, and conversely, some that did not require NSPARs on NOAA will need them on EOS.

RESPONSE:

The EOS part selection requirement which will reduce the number of NSPARs is the definition that Grade 2 parts are "standard" if they are listed in either PPL 20 or MIL-STD-975. On NOAA, all Grade 2 parts required NSPARs. A review of the latest PDIL for NOAA was performed and 34 NSPARs/parts were identified which fall into the above category and, therefore, review/approval by NASA would not have been required.

The EOS part selection requirement which will increase the number of NSPARs is the definition that any part not listed on either PPL 20 or MIL-STD-975 is considered "non-standard". On NOAA, JANS level microcircuits/semiconductors and passive devices listed on a QPL were considered "standard" even if they were not listed on the PPL or MIL-STD-975. A review of the latest PDIL for NOAA indicated 31 parts which fall into the above category and, therefore, NSPARs would have been required.

Assuming the new parts selection requirements will result in similar plus/minus NSPAR numbers on EOS, the impact on labor was assessed. The elimination of 34 carry-over NSPARs would have no impact on planned effort by Aerojet Design Assurance since these documents

already exist and resubmittal would not be required. For NASA it means that those 34 NSPARs will not have to be reviewed/approved.

The need for 31 new NSPARs would require added labor to prepare and submit the NSPARs for NASA review/approval. Based on NOAA/AMSU-A experience each NSPAR requires approximately 5 manhours which calculates to a total of 5 x 31 = 155 manhours (SE-3).

Emil Lorenz 8/29/94

Emil Lorenz Date

ACTION ITEM RESPONSE

FAXED 9/30/94

Action Item No: 7/27-1

Action Requested:

What problem does going to 10V (from 8V) to the mixer/IF amp solve? Provide a list of SDARs. What is the supporting data that the problems are solved?

Response:

Out-of-specification conditions reported in the NOAA/AMSU-A mixer/IF amplifier units were attributed to the low operating voltage (+8.0V) and current budget as can be seen in the attached Supplier's Discrepancy Action Requests (SDARs). These SDARs are: 1) 1dB output compression point; 2) Gain versus voltage sensitivity; 3) Overall gain; 4) Gain versus temperature sensitivity; and 5) Gain flatness. The SDARs were approved based on a trade analysis as some other receiver components outperformed the specified requirements.

Although no supporting data for the specific performance improvements are available, the supplier (Spacek Labs, Inc.) expressed with confidence that the SDARs described above can be eliminated by increasing the bias voltage of the amplifiers from +8V to +10V. The following is the supplier's action plans to eliminate the SDARs imposed on the NOAA/AMSU-A to mixer/IF amplifiers.

1) 1dB output compression point:
With the additional voltage Spacek can ask Cougar Components who makes the output TO-8 cans to change the collector resistors to give a 1 dB output compression point of +10 dBm minimum.

2) Gain versus voltage sensitivity:
By raising the amplifier input voltage the gain versus voltage will definitely improve. In addition, the new specification is 2.5dB/Volt, which was the worst case on the previously delivered mixer/IF amplifiers, so there is no doubt that this SDAR will be eliminated.

3) Overall gain:
The 0.1dB out-of-specification condition (out of 59dB) of the -10 unit can readily be corrected with increased bias voltage as the gain of the transistors can be increased with bias voltage.

4) Gain versus temperature sensitivity:
Spacek anticipates improvement on the gain versus temperature sensitivity for the -10 unit as it can select more linear operating point of the unit with increased bias voltage.

dp6/94

5) Gain flatness:
   With the additional voltage Spacek can select more linear operating point of the unit with frequency to improve the gain flatness.

   Dash -1 through -8 units are for the channels 1 through 8, dash -9 unit for the channels 9 through 14, and dash -10 for the channel 15.

Y. E. Ma, Team Leader
Receiver Subsystem

dp6/94

350

AESC AEROJET ELECTROSYSTEMS COMPANY

10-009-030 Rev. 6-85

SUPPLIER'S DISCREPANCY ACTION REQUEST

FOR SUPPLIER USE	FOR AESC USE
1. SUPPLIER SDAR S/N: 20	29. AESC SDAR S/N
2. DATE SUBMITTED: 5/10/90	30. DATE RECEIVED

TO BE COMPLETED BY SUPPLIER (Please Type or Print) THE SUPPLIER ACCEPTS FULL RESPONSIBILITY FOR ACCURACY OF INFORMATION BELOW:

3. SUPPLIER'S NAME AND ADDRESS

SPACEK LABS, INC.
212 E. GUTIERREZ ST.
SANTA BARBARA, CA 93101

4. SUPPLIER'S CODE	5. BUYER'S CODE	6. CONTRACT NO.	7. WORK ORDER NO.	8. P.O. NUMBER
86472	43	NAS5-29402	2536-93-1000	06567

9. PART NUMBER	C/L	10. PART NAME	11. NEXT ASSY.
1331562-1A to9A		Mixer-Amplifier Assembly	

12. Qty. on Order	13. Qty. of Shpt	14. QTY. PAST DUE	15. PREVIOUS SDAR (DATE & NO.)
50	10	40	2-10-90

16. Qty.	17. Ser'l Nos.	18. CONDITION:	19. ACTION REQUESTED:	20. CAUSE & CORRECTION ACTION: (Include Effective Date, Serial Numbers or Quantity of Parts Affected)
36	9K01 - 9K09 9K11 - 9K19 9K21 - 9K29 9K31 - 9K39	The output 1.0 dB compression point on the dash -1A thru -9A amplifiers is measuring under 1.0 dB. The worst case reading is 8.2 dB	Approve 1.0 dB output compression point of 8.0dB minimum for the flight units.	This condition is caused by the low operating voltage +8.0 VDC and current budget, as well as an additional .1 volt drop across the S level protection diode. The condition can not be corrected without increasing the input voltage/Currrent, without trading off the amplifier gain and flatness. Rejection of this request would cause long schedule and delivery delays.

(Attach Extra Sheets, Photographs, Sketches, etc., as Necessary)

21. SIGNATURE OF SUPPLIER'S AUTHORIZED REPRESENTATIVE:	22. SDAR COPIES REQUIRED	23.	24. MODEL:
William F. Neuman			

TO BE COMPLETED BY AESC (Please Type or Print)

25. COMMENTS OF SQR (or SPVR Receiving Inspection)/BUYER

26. SIGNATURE OF SQR (or SPVR Receiving Inspection) DATE	27. SIGNATURE OF GOVT. REP. AT SOURCE (If Req'd) DATE	28. SIGNATURE OF BUYER DATE

31. DISPOSITION:

32. QUALITY CONTROL DATE	33. ENGINEERING DATE	34. CUSTOMER DATE	35.

SPECIAL INSTRUCTIONS TO SUPPLIER

1. FINAL APPROVAL OF THIS REQUEST SHALL APPLY ONLY TO THE ITEMS [illegible] REIN AND SHALL NOT ESTABLISH A PRECEDENT. ALL FINDINGS WILL BE SUBJECT TO VERIFICATION AND FINAL APPROVAL AT AESC.
2. WITHHOLD SHIPMENT PENDING RECEIPT OF APPROVED SDAR. FOR SHIP [illegible] GATE MATERIAL SPECIFIED HEREON AND ATTACH COPY OF APPROVED SDAR.

STK NO. [illegible]

AEROJET ELECTROSYSTEMS COMPANY

10-609-630 Rev. 6-85

SUPPLIER'S DISCREPANCY ACTION REQUEST

FOR SUPPLIER USE	FOR AESC USE
1. SUPPLIER SDAR S/N: 21	29. AESC SDAR S/N
2. DATE SUBMITTED: 5/10/90	30. DATE RECEIVED

TO BE COMPLETED BY SUPPLIER (Please Type or Print) THE SUPPLIER ACCEPTS FULL RESPONSIBILITY FOR ACCURACY OF INFORMATION BELOW:

3. SUPPLIER'S NAME AND ADDRESS

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara, CA 93101

4. SUPPLIER'S CODE	5. BUYER'S CODE	6. CONTRACT NO.	7. WORK ORDER NO.	8. P.O. NUMBER
86472	43	NAS5-29402	2536-93-1000	06567

9. PART NUMBER	C/L	10. PART NAME	11. NEXT ASSY.
1331562-1Ato10A		Mixer-Amplifier Assembly	

12. Qty. on Order	13. Qty. of Shpt	14. QTY. PAST DUE	15. PREVIOUS SDAR (DATE & NO.)
50	10	40	20 5/10/90

16. Qty.	17. Ser'l Nos.	18. CONDITION:	19. ACTION REQUESTED:	20. CAUSE & CORRECTION ACTION: (Include Effectivity Date, Serial Numbers or Quantity of Parts Affected)
.0	9K01 - 9K40	The gain versus voltage sensitivity of all amplifier dash numbers is measuring high, as were the engineering units. The worst case is 2.5 dB/volt.	Approve gain versus voltage sensitivity of 3.0 dB/volt maximum for the flight amplifiers.	This condition is caused by the low operating voltag +8.0 VDC and current budget as well as an additional .1 volt drop across the S level protection diode. This condition can not be corrected without increasir the input voltage and curre Rejection of this requrest would cause long schedule and delivery delays.

(Attach Extra Sheets, Photographs, Sketches, etc., as Necessary)

21. SIGNATURE OF SUPPLIER'S AUTHORIZED REPRESENTATIVE:	22. SDAR COPIES REQUIRED	23.	24. MODEL:
William T. Neinson			

TO BE COMPLETED BY AESC (Please Type or Print)

25. COMMENTS OF SQR (or SPVR Receiving Inspection)/BUYER

26. SIGNATURE OF SQR (or SPVR Receiving Inspection) DATE	27. SIGNATURE OF GOVT. REP. AT SOURCE (If Req'd) DATE	28. SIGNATURE OF BUYER DATE

31. DISPOSITION:

32. QUALITY CONTROL DATE	33. ENGINEERING DATE	34. CUSTOMER DATE	35.

SPECIAL INSTRUCTIONS TO SUPPLIER

1. FINAL APPROVAL OF THIS REQUEST SHALL APPLY ONLY TO THE ITEMS [illegible]EIN AND SHALL NOT ESTABLISH A PRECEDENT. ALL FINDINGS WILL BE SUBJECT TO VERIFICATION AND FINAL APPROVAL AT AESC.
2. WITHHOLD SHIPMENT PENDING RECEIPT OF APPROVED SDAR. FOR SHI[illegible]GATE MATERIAL SPECIFIED HEREON AND ATTACH COPY OF APPROVED SDAR.

AEROJET ELECTROSYSTEMS COMPANY

10-009-030 Rev. 6-85

SUPPLIER'S DISCREPANCY ACTION REQUEST

FOR SUPPLIER USE	FOR AESC USE
1. SUPPLIER SDAR S/N: 22	29. AESC SDAR S/N:
2. DATE SUBMITTED: 5/10/90	30. DATE RECEIVED:

TO BE COMPLETED BY SUPPLIER (Please Type or Print) THE SUPPLIER ACCEPTS FULL RESPONSIBILITY FOR ACCURACY OF INFORMATION BELOW:

3. SUPPLIER'S NAME AND ADDRESS
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara, CA 93101

4. SUPPLIER'S CODE	5. BUYER'S CODE	6. CONTRACT NO.	7. WORK ORDER NO.	8. P.O. NUMBER
86472	43	NAS5-29402	2536-93-1000	06567

9. PART NUMBER	C/L	10. PART NAME	11. NEXT ASSY.
1331562-10A		Mixer-Amplifier Assembly	

12. Qty. on Order	13. Qty. of Shpt	14. QTY. PAST DUE	15. PREVIOUS SDAR (DATE & NO.)
50	10	40	21 5/10/90

16. Qty.	17. Ser'l Nos.	18. CONDITION:	19. ACTION REQUESTED:	20. CAUSE & CORRECTION ACTION: (Include Effectivity Date, Serial Numbers or Quantity of Parts Affected)
4	9K10 9K20 9K30 9K40	The -10 amplifier overall gain is reading as low as 58.9 dB. i.e. it is a 0.1 dB below the minimum overall gain spec. This condition occurs over the last 10 MHz of the I.F. pass band.	Approve -10 flight amplifiers with overall gains of 58.5 dB minimum.	This condition is caused by the low operating voltage +8.0 VDC and current budget, as well as by an additional .1 volt drop across the S level protection diode, an a typical drop of about .5 for each WJ can at 1550 MHz. To the greatest extent possi we have compensated for this in the tuning of the preampl ifer stage. This condition can not be be corrected without increas the input voltage and curre Rejection of this request would cause long schedule and delivery delays

(Attach Extra Sheets, Photographs, Sketches, etc., as Necessary)

21. SIGNATURE OF SUPPLIER'S AUTHORIZED REPRESENTATIVE:	22. SDAR COPIES REQUIRED	23.	24. MODEL:
William M Newman			

TO BE COMPLETED BY AESC (Please Type or Print)

25. COMMENTS OF SQR (or SPVR Receiving Inspection)/BUYER

26. SIGNATURE OF SQR (or SPVR Receiving Inspection) DATE	27. SIGNATURE OF GOVT. REP. AT SOURCE (If Req'd) DATE	28. SIGNATURE OF BUYER DATE

31. DISPOSITION:

32. QUALITY CONTROL DATE	33. ENGINEERING DATE	34. CUSTOMER DATE	35.

SPECIAL INSTRUCTIONS TO SUPPLIER

1. FINAL APPROVAL OF THIS REQUEST SHALL APPLY ONLY TO THE ITEMS SPE IN AND SHALL NOT ESTABLISH A PRECEDENT. ALL FINDINGS WILL BE SUBJECT TO VERIFICATION AND FINAL APPROVAL AT AESC.
2. WITHHOLD SHIPMENT PENDING RECEIPT OF APPROVED SDAR. FOR SHIPM ATE MATERIAL SPECIFIED HEREON AND ATTACH COPY OF APPROVED SDAR.

AEROJET ELECTROSYSTEMS COMPANY

10-009-830 Rev. 6-85

SUPPLIER'S DISCREPANCY ACTION REQUEST

FOR SUPPLIER USE	FOR AESC USE
1. SUPPLIER SDAR S/N: 23	29. AESC SDAR S/N
2. DATE SUBMITTED: 5/10/90	30. DATE RECEIVED

TO BE COMPLETED BY SUPPLIER (Please Type or Print) THE SUPPLIER ACCEPTS FULL RESPONSIBILITY FOR ACCURACY OF INFORMATION BELOW:

3. SUPPLIER'S NAME AND ADDRESS

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara, CA 93101

4. SUPPLIER'S CODE	5. BUYER'S CODE	6. CONTRACT NO.	7. WORK ORDER NO.	8. P.O. NUMBER
86472	43	NAS5-29402	2536-93-1000	06567

9. PART NUMBER	C/L	10. PART NAME	11. NEXT ASSY.
1331562-1Ato10A		Mixer-Amplifier Assembly	

12. Qty. on Order	13. Qty. of Shp't	14. QTY. PAST DUE	15. PREVIOUS SDAR (DATE & NO.)
50	10	40	22 5/10/90

16. Qty.: 40

17. Ser'l Nos.: 9K01 - 9K40

18. CONDITION:

The dash -1A thru -9A amplifiers appear to be reading right on spec. 0.02 db per degree C. The dash -10A amplifiers are reading 0.03 dB per degree C and are out of spec. by 0.01 dB per degree C.

Since the graph data is subject to individual interpertation the dash -1A thru -9A should be given broader graph interpertation.

19. ACTION REQUESTED:

Approve gain versus temperature maximum of 0.03 dB per degree C for the -1A to the dash -9A, and 0.05 dB per degree C for the -10A amplifiers.

20. CAUSE & CORRECTION ACTION: (Include Effectivity Date, Serial Numbers or Quantity of Parts Affected)

This condition is caused by the low operating voltage +8.0 VDC and current budget, as well as by an additional .1 volt drop across the S level protection diode.

This conditon can not be corrected without increasing the input voltage and curre[illegible]

Rejection of this request would cause long schedule and delivery delays.

(Attach Extra Sheets, Photographs, Sketches, etc., as Necessary)

21. SIGNATURE OF SUPPLIER'S AUTHORIZED REPRESENTATIVE: William [illegible]

22. SDAR COPIES REQUIRED

23.

24. MODEL:

TO BE COMPLETED BY AESC (Please Type or Print)

25. COMMENTS OF SQR (or SPVR Receiving Inspection)/BUYER

26. SIGNATURE OF SQR (or SPVR Receiving Inspection) DATE

27. SIGNATURE OF GOVT. REP. AT SOURCE (If Req'd) DATE

28. SIGNATURE OF BUYER DATE

31. DISPOSITION:

32. QUALITY CONTROL DATE

33. ENGINEERING DATE

34. CUSTOMER DATE

35.

SPECIAL INSTRUCTIONS TO SUPPLIER

1. FINAL APPROVAL OF THIS REQUEST SHALL APPLY ONLY TO THE ITEMS SPE[...]N AND SHALL NOT ESTABLISH A PRECEDENT. ALL FINDINGS WILL BE SUBJECT TO VERIFICATION AND FINAL APPROVAL AT AESC.
2. WITHHOLD SHIPMENT PENDING RECEIPT OF APPROVED SDAR. FOR SHIPM[...]ATE MATERIAL SPECIFIED HEREON AND ATTACH COPY OF APPROVED SDAR.

JUN 13 1990

AEROJET ELECTROSYSTEMS COMPANY

FOR SUPPLIER USE	FOR AESC USE
1. SUPPLIER SDAR S/N 24	2. AESC SDAR S/N 90-096
3. DATE SUBMITTED 5/16/90	36. DATE RECEIVED 5/23/90

10-009-030 Rev. 6-85

SUPPLIER'S DISCREPANCY ACTION REQUEST

JUN 11 1990

TO BE COMPLETED BY SUPPLIER (Please Type or Print) THE SUPPLIER ACCEPTS FULL RESPONSIBILITY FOR ACCURACY OF INFORMATION BELOW:

3. SUPPLIER'S NAME AND ADDRESS	4. SUPPLIER'S CODE	5. BUYER'S CODE	6. CONTRACT NO.	7. WORK ORDER NO.	8. P.O. NUMBER
Spacek Labs, Inc. 212 E. Gutierrez St. Santa Barbara, CA 93101	86472	43	NAS5-29402	2536-93-1000	06567

9. PART NUMBER	C/L	10. PART NAME	11. NEXT ASSY.
1331562-1Ato-10A		Mixer-Amplifier Assembly	

12. Qty. on Order	13. Qty. of Shpt	14. QTY. PAST DUE	15. PREVIOUS SDAR (DATE & NO.)
50	10	40	23 5/10/90

16. Qty.	17. Ser'l Nos.	18. CONDITION:	19. ACTION REQUESTED:	20. CAUSE & CORRECTION ACTION: (Include Effectivity Date, Serial Numbers or Quantity of Parts Affected)
32	9K01 9K04 ... 9K10 9K11 9K14 ... 9K20 9K21 9K24 ... 9K30 9K31 9K34 ... 9K40	The dash -1A, and dash -4A thru -9A amplifiers are reading just in spec or over spec for gain flatness by .2dB worst case. The dash -10A amplifier is measuring out of spec for gain flatness by .6dB worst case. See attached amplifier summary sheet for measurements.	Accept a gain flatness for the dash -1A thru -9A amplifiers of .9dB peak-to-peak, and 2.0dB peak-to-peak for the dash -10A amplifier.	This condition is caused by the low operating voltage of +8.0 VDC and current budget, as well as by an additional .1 volt drop across the protection diode Additionally for the -10A the 3 TO-8 amplifier cans have up to .5dB drop per ca at 1550 MHz. This condition can not be corrected without increasi the input voltage/current. Rejection of this request would cause long schedule and delivery delays.

(Attach Extra Sheets, Photographs, Sketches, etc., as Necessary)

21. SIGNATURE OF SUPPLIER'S AUTHORIZED REPRESENTATIVE:	22. SDAR COPIES REQUIRED	23.	24. MODEL
William N. Neumann			

TO BE COMPLETED BY AESC (Please Type or Print)

25. COMMENTS OF SQR (or SPVR Receiving Inspection)/BUYER

26. SIGNATURE OF SQR (or SPVR Receiving Inspection) DATE	27. SIGNATURE OF GOVT. REP. AT SOURCE (If Req'd) DATE	28. SIGNATURE OF BUYER	DATE
		[signature]	5/22/90

31. DISPOSITION:

32. QUALITY CONTROL DATE	33. ENGINEERING DATE	34. CUSTOMER DATE	35.
			32/32

SPECIAL INSTRUCTIONS TO SUPPLIER

1. FINAL APPROVAL OF THIS REQUEST SHALL APPLY ONLY TO THE ITE D HEREIN AND SHALL NOT ESTABLISH A PRECEDENT. ALL FINDINGS WILL BE SUB. TO VERIFICATION AND FINAL APPROVAL AT AESC.
2. WITHHOLD SHIPMENT PENDING RECEIPT OF APPROVED SDAR. FOR SEGREGATE MATERIAL SPECIFIED HEREON AND ATTACH COPY OF APPROVED SDAR

STK. NO. A-5-01

AMPLIFIER ELECTRICAL TESTS

UUT	OVERALL GAIN SPEC	OVERALL GAIN MEAS	GAIN FLATNESS SPEC	GAIN FLATNESS MEAS	GAIN VS. VOLT SPEC	GAIN VS. VOLT MEAS	GAIN VS. TEMP SPEC	GAIN VS. TEMP MEAS	1dB COMPRESSION SPEC	1dB COMPRESSION Lunato MEAS
K01	70±1	IN SPEC	0.6dB ppk	0.6	0.5dB/V	2.5	0.02 dB/°C	0.02	+10 dBm	9.0
K02	72±1	IN SPEC		0.2		2.0		0.02		9.4
K03	72±1	IN SPEC		0.5		2.0		0.02		9.4
9K04	70±1	IN SPEC		0.8		2.0		0.02		9.8
K05		IN SPEC		0.5		2.5		0.02		9.5
9K06		IN SPEC		0.6		2.0		0.02		9.5
K07		IN SPEC		0.6		2.0		0.02		9.3
9K08		IN SPEC		0.4		2.0		0.02		9.7
K09	60±1	IN SPEC		0.6		2.0		0.02		8.9
9K10	60±1	58.9	1.2 dB ppk	1.7		1.0		0.03		11.5
K11	70±1	IN SPEC	0.6 dB ppk	0.7		2.0		0.02		8.3
9K12	72±1	IN SPEC		0.4		2.0		0.02		9.0
9K13	72±1	IN SPEC		0.3		2.0		0.02		9.3
9K14	70±1	IN SPEC		0.7		2.0		0.02		9.3
9K15		IN SPEC		0.7		2.0		0.02		9.1
9K16		IN SPEC		0.7		2.0		0.02		8.8
9K17		IN SPEC		0.6		2.0		0.02		9.5
9K18		IN SPEC		0.6		2.0		0.02		9.3
9K19	60±1	IN SPEC		0.6		2.0		0.02		8.2
9K20	60±1	IN SPEC	1.2 dB ppk	1.8		1.5		0.03		11.5

NOTE: ALL UNITS MEET OUT OF BAND GAIN SPEC OF 740dBc.

~~OUT OF SPEC~~

WORST CASE

K.R
5.10.90

ACTION ITEM RESPONSE

8/7/94
To M. Domen
During Visit.

ACTION ITEM NO. 7/27-3

ACTION REQESTED:

Be sure that bolts used on TIROS spacecraft are specified in the ICD.

RESPONSE:

The NOAA/AMSU ICD has been reviewed. The following paragraph has been incorporated into the ICD (Draft) to describe the bolts used on the TIROS spacecraft.

3.4.3 Mounting Hardware

The mounting hardware is described in English units (inches) because EOS AMSU-A has heritage to the NOAA AMSU-A instruments. The Spacecraft Contractor shall provide all instrument mounting hardware. The mounting hardware is defined as a) No. 10 (.190 inches dia) Socket Head Cap Screws capable of withstanding 85 in-lbs of installation torque, b) No. 10 metal washers and c) fiberglass thermal washers. The final assembly of the mounting hardware as it relates to the AMSU-A instruments is as shown in Figure 3.4.3-1. The requried dimensions of the fiberglass thermal washers are shown on Figure 3.43.-2.

for Weldon Chapman, EOS/AMSU-A
Systems Engineering Product
Team Leader

8/11/94
Date

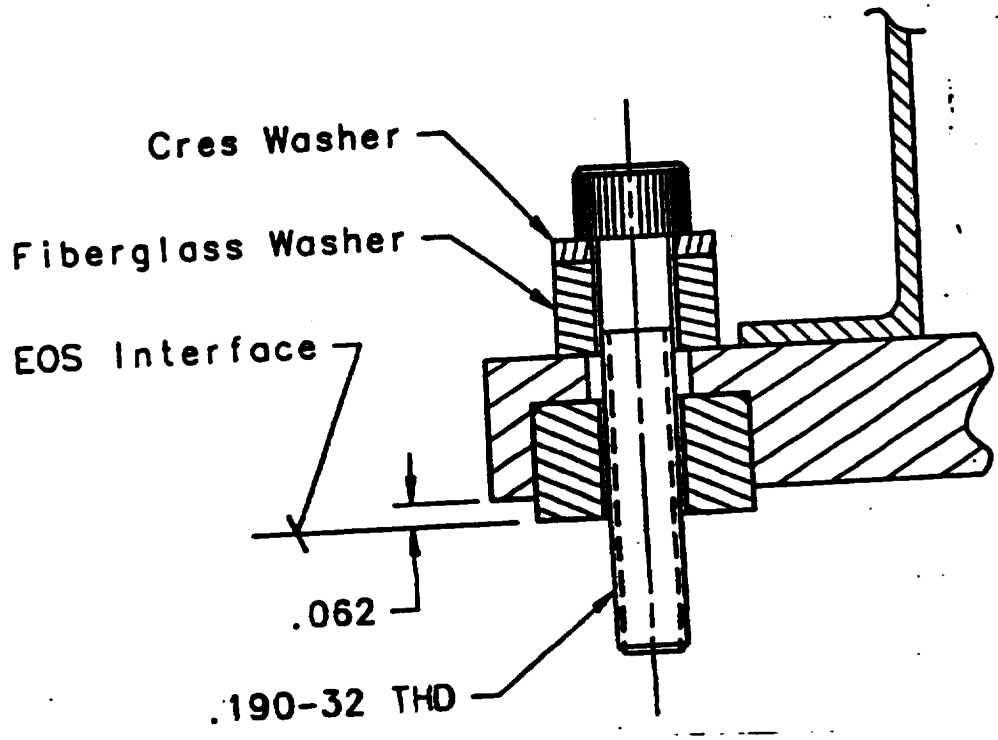

Figure 3.4.3-1 AMSU-A Mounting Hardware

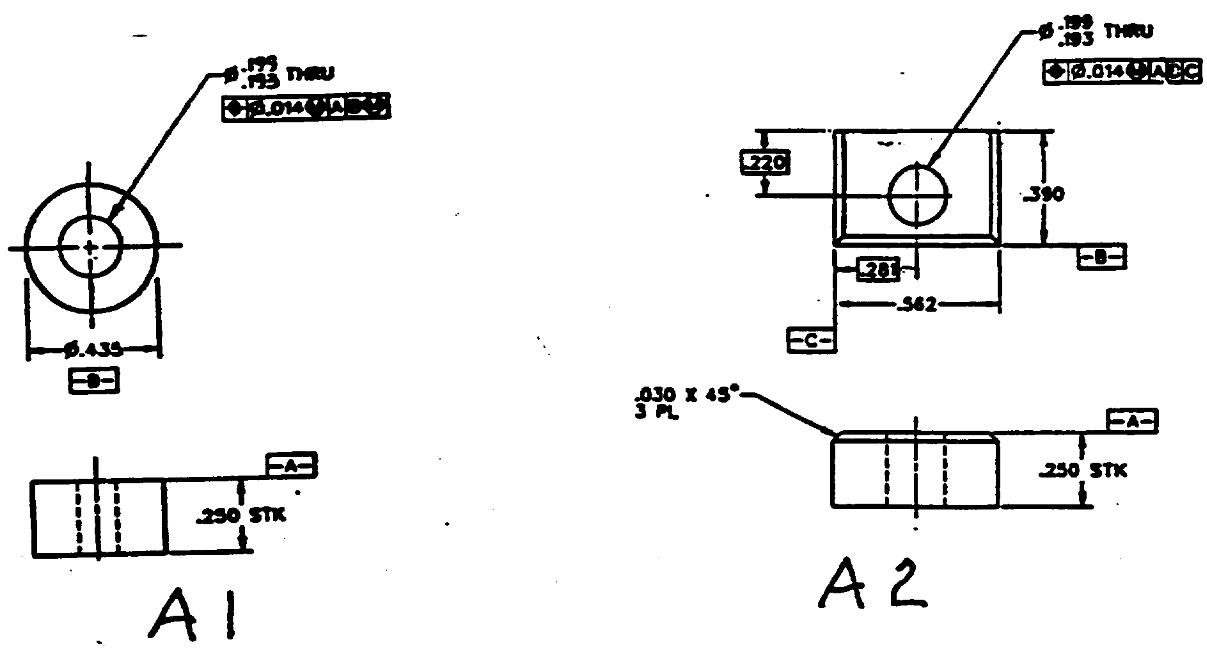

Figure 3.4.3-2 Thermal Washer Dimensions

ACTION ITEM RESPONSE

ACTION ITEM NO: 7/27-4

ACTION REQUESTED: Should the edge stiffening be implemented on the A2 to raise the natural frequency from 80 Hz on the NOAA unit to 90 Hz on the EOS unit? What is the trade between having to do additional analysis because we are less than 100 Hz and trying to get to 100 Hz? Include cost to do design change (including all paper and tests) and what is saved in production. Look at weight margin of N & N'.

RESPONSE: In preparation for the EOS AMSU-A PDR, the A2 structural math model was changed to include edge stiffening and natural frequency analyses were conducted. Removing the mass of the momentum compensator had a small (~1 Hz) effect on natural frequency. The combined effect of edge stiffening and compensator mass removal was to raise the natural frequency to 90.5 Hz. The weight penalty for the edge stiffener has been previously reported to be 2 pounds. Aerojet believes that the measured frequency will be slightly higher because the modeling of the base/side panel joint flexibility has remained conservative.

Aerojet had anticipated that the natural frequency could be raised above 100 Hz. Approximately 2 weeks of additional dynamic analysis were undertaken to find ways to raise the natural frequency. These efforts were unsuccessful because of the self-imposed constraints of "no major changes." Further natural frequency increases could be undoubtedly be obtained by increasing the thickness and stiffness of the honeycomb baseplate or increasing the number of spacecraft attachment bolts.

The scope of work remaining to change the EOS AMSU-A2 baseplate edge stiffener is 1)draw and release a replacement for PN1331211, Baseplate Assembly, Honeycomb and 2)incorporate the new part at the next assembly, PN 1331303, Antenna Subassembly, Machined A2. The estimated hours are:

Skill	Hours
Draftsman	40
Checker	20
Engineering Sign-off	15
	75

Since the EOS A2 NASTRAN model currently has edge beams, proceeding with solid edge beams will save effort to remove the solid beams from the model. Changing the beams is simple, but the new model would still have to be subjected to the 3 pages of GIRD check cases.

Activity	Hours
NASTRAN model Checks	(60)

The solid edge stiffener would save Honeycomb Baseplate fabrication time. Currently, the edge stiffener has a channel cross-section between the mounting bolt pads. The NOAA edge stiffener starts as a solid that is milled into a channel between the mounting bolt pads. The estimated savings are shown below:

Activity	Hours
N/C Programming (Non-recurring)	20)
N/C Milling (Recurring)	(25)
Inspection (Recurring)	(5)
	(50)

The cost analysis shows that the break even point for continuing with the solid edge beam is less than one unit.

The work required to increase the EOS AMSU-A2 above 100 Hz would require additional dynamic analyses to define the required changes. The assumption for the cost estimates are that the baseplate would be thickened and stiffened, and that the mounting hole pattern would change. This would require new baseplate, interface drill jig, interface control, and machined subassembly drawings. The handling procedure would also require changing.

Skill	Hours
Dynamicist	120
Draftsman	160
Checker	80
Specification Writer	40
Design Engineers	80
	480

The response to Action Item 5/11-2 detailed the effort required to test and document the NOAA AMSU-A2 natural frequency of approximately 81 Hz. The man-hours for repeating the activity for EOS should be approximately 3/4 of the time expended on NOAA because the first modeshape is now well understood and test set-ups providing little pertinent data can be eliminated. Eliminating the need for testing will save:

Skill	Hours
Dynamicist	(120)
Test Engineer	(90)
Test Technician	(90)
NASTRAN Analyst	(180)
	(480)

If nothing is done to change the NOAA baseplate, this testing effort would be repeated for the EOS AMSU-A2. The removal of the momentum compensator is enough to change the natural frequency from that previously measured.

The maximum specified weight for the A2 unit is 104.5 pounds. The actual NOAA A2 weight is 103.0 pounds. The added weight for the edge stiffener of 2.0 pounds would lift the unit weight above the maximum allowed weight.

The probability of achieving 100 Hz on the NOAA A2 modules cannot be answered without first defining new constraints (e.g. weight) and then performing additional analysis. The estimated effort would be greater than that stated above (480 Hours) because of the design constraints.

Wayne Ely, Team Leader
EOS Mechanical/Thermal

8/29/94

EOS/AMSU-A Action Item Response

Action Item No. 7/27-6:

Description:

Determine basis for 1553 RT validation plan.

Response:

The validation plan for the MIL-STD-1553 interface is based on the need to validate the following six key functions:
- Process instrument commands.
- Process timing data from the spacecraft and derive 8 second frame pulses.
- Format science data into MIL-STD-1553 data packets and install at RAM subaddresses 1 through 16.
- Format engineering data into MIL-STD-1553 data packets and install at RAM subaddresses 17 through 20.
- Create data checksum.
- Append special header to start of data block.

The verification process is an end to end checkout of the entire interface CCA. It demonstrates the ability of the EOS/AMSU-A signal processor to handle commands and data via the MIL-STD-1553 interface. Specific MIL-STD-1553 transceiver functions are validated only to the extent that they contribute to this end to end test. This philosophy is based on the fact that a commercially available multi-chip module has been selected to perform all the transceiver and bus specific functions. This device will be purchased under an Aerojet Specification Control Drawing that will ensure it is validated by the manufacturer to meet all performance requirements. The interface designed by Aerojet is essentially a means of coupling this device to the EOS/AMSU-A signal processor.

Final verification of the MIL-STD-1553 interface will come when it is tested using the GFE Spacecraft Simulator. In this test it is planned to exercise all interface functions and apply all possible I/O conditions.

M.M.Pluck — Aug 2 1994
Date

EOS/AMSU-A Action Item Response

Action Item No. 7/27-7:

Description:

Define current threshold on A/D converter dropout.

Response:

The A/D Converter dropout referred to in the description above is a circuit designed to interrupt power to the A/D converter microchip in the event a latchup condition occurs due to heavy particle bombardment. This latchup condition is analagous to the `ON' state of an SCR and normal operation can only be retrieved by the removal of power. Failure to react rapidly to a latchup condition can result in permanent thermal damage to the microchip.

The latchup circumvention circuit used in the AMSU-A signal processor is designed to trigger when the supply current to the A/D converter microchip exceeds 130mA. Normal operational current is 12mA and maximum current under worst case conditions is 25mA. Sustained current in a latchup condition is 275mA. The triggering threshold is therefore at a current more than 5 times greater than the maximum current likely to be experienced in normal operation.

In order to avoid false triggering due to the inrush current when power is first applied, a 4mS delay circuit is incorporated. Typical settling time for the inrush current is 1mS.

M.M.Pluck — Aug. 9 1994

M.M.Pluck Date

ACTION ITEM RESPONSE

From the Desk of:

D. W. Howell
x1039

August 9, 1994

FAXED 8/9/94

ACTION ITEM NO. 7/27-8

To: Gus Wessels/NASA

Gus,

As a follow-up to our discussion regarding MRP training (and in response to Action Item 7/27-8), we can have a training session anytime it's convenient for you. All classes are custom scheduled. Just give me a couple of weeks notice and I'll set it up.

We can do either a one-day, six-hour version or two days with three hours each day. It will include both lecture and demonstration. (There is another version that includes hands-on training - 12 hours long, for direct users - but I don't think we need that.)

I'll probably join you since I also need to get "up-to-speed". Let me know what will work out for you.

Thanks.

D. W. Howell
Program Manager
EOS/AMSU-A Program

CC: M. Domen/NASA
A. Nieto/Aerojet
B. Terrell/Aerojet
R. Singer/Aerojet

GENCORP
AEROJET

8 August 1994

EOS/AMSU-A Action Item Response

Action Item 7/27-9

Description:

Define what it takes to upgrade the CSTOL workstation to be capable of doing the complete instrument functions at the spacecraft contractors (not just listen only).

Response:

By adding an available 1553B SBus Serial interface module (EDT part # S53B-1) to the selected Sun SPARC machine, the Spacecraft Interface Workstation (SIW) could communicate with and receive data from the AMSU units via the 1553B interface. The SIW would act as the Bus Controller during unit test. If the units were being controlled by the spacecraft Bus Controller, the SIW would revert to a Remote Terminal configuration and perform as a receive-only station, receiving and processing AMSU data outputs. Since the power supply and power distribution of the Special Test Equipment (STE) for the AMSU units is freestanding and manually controlled, power to the AMSU units could be provided either by the Spacecraft or an included power supply subsystem in the SIW. Figure 1 is a simplified interconnect diagram of the SIW and Figure 2 is a sketch of a possible packaging of the SIW.

The added power supply, power distribution module, unit interface and cabling would be identical in design to that used in the STE, therefore, additional design efforts would be expended only on packaging and CSTOL software expansion to include unit control functions. Additional material costs would include purchasing of the 1553B bus interface card, the power supply, the PRT logger, the desk rack and parts for fabrication of the Power Distribution module, unit interface and interconnecting cables.

8/9/94
D. W. Howell Date

8/8/94
D. S. Mc Donald Date

8/8/94
R. W. Schwantje Date

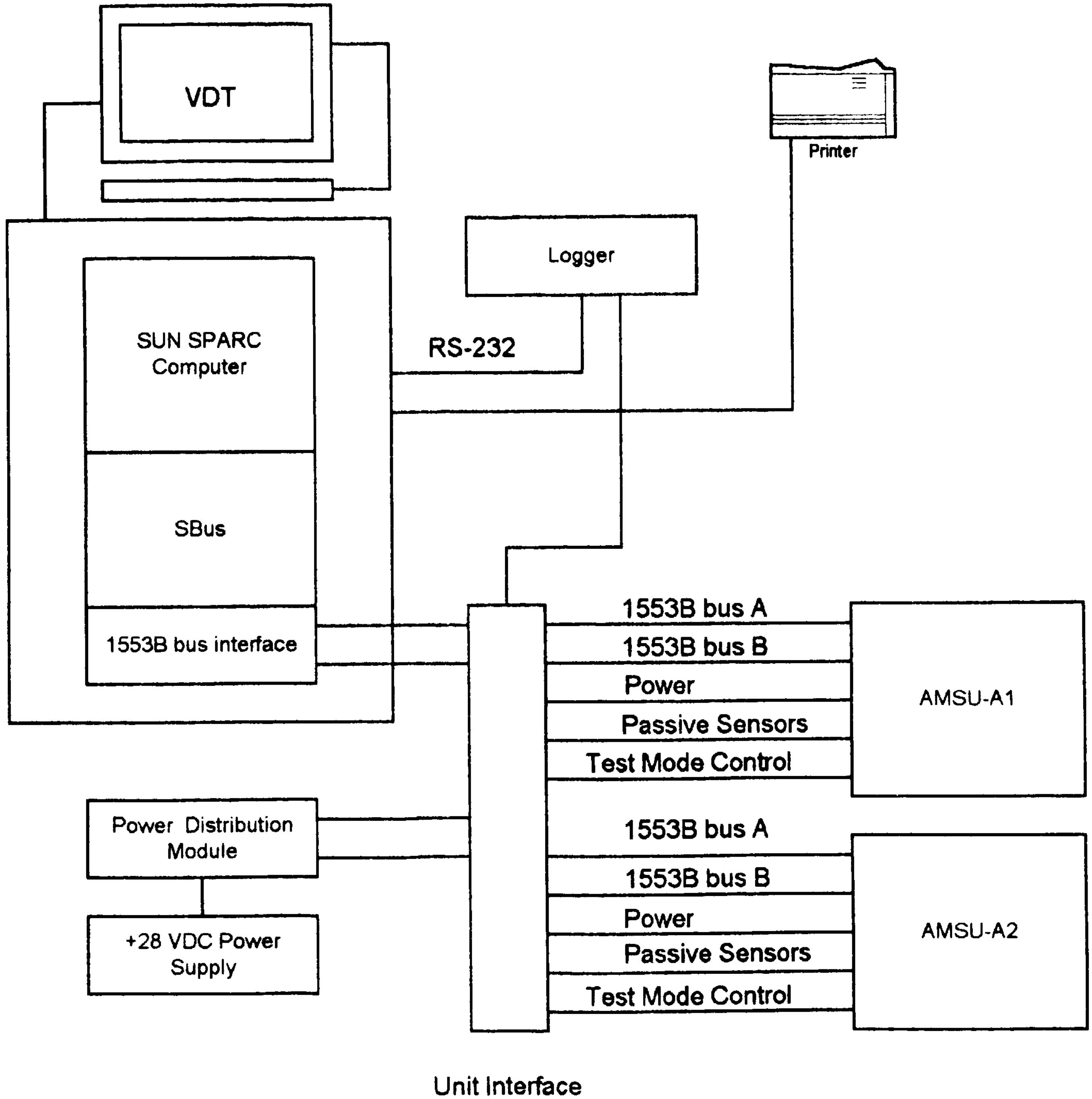

Figure 1 Spacecraft Interface Workstation

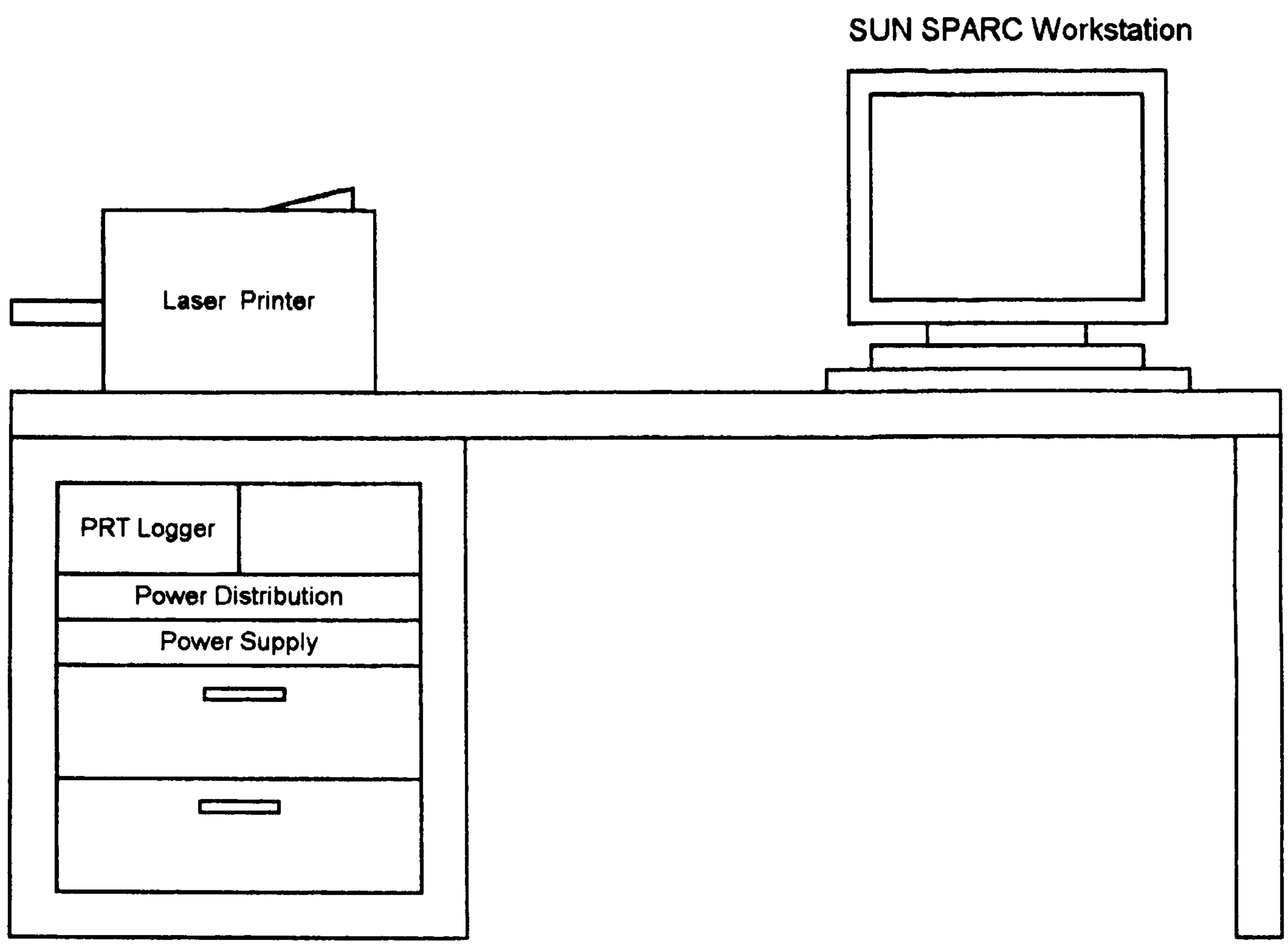

Figure 2 Physical Layout of Spacecraft Interface Workstation

ACTION ITEM RESPONSE

ACTION ITEM NO: 7/27-10

ACTION REQUESTED:

Review pyroshock and sine burst requirements and applicability to component and instrument.

RESPONSE:

1. Sine Burst

The sine burst test can be traced to the structural verification section (3.4.3.1) in the PAR. The structural verification method is not specified in the PAR. The requirement is that the structural verification shall be accomplished by a combination of analysis and test. The usual method is to apply a set of loads to the structure.

EOS AMSU-A will use the same method of structural verification as was used on NOAA AMSU-A --the sine burst test. The test is conducted at a frequency that is approximately 1/3 the first natural frequency of the instrument. Consequently, there is no amplification or attenuation through the structure and the components see the same levels as are introduced at the instrument mounting interface.

The GIRD requirements regarding sructural verification of components are for either analysis or test. If components were qualified in a sine burst test, the level would be 21 g's peak. However, the AMSU-A components are also required to pass a random vibration test at 19.96 Grms. Statistically, the component may see peaks that are 3 times the Grms value. In addition, the random vibration extends from 20 to 2000 Hz and most likely excites the first several natural frequencies of the component.

Considering the above comparison, the random vibration test is a much more severe test than the sine burst test at the component level. Consequently, the sine burst can be eliminated with no risk to the components.

Aerojet is therefore proceeding to delete all sine burst test requirements from the component specifications, with the exception of the A2 Antenna.

2. Pyroshock Testing

The pyroshock environment is defined in paragraph 10.4 of the GIRD. The PAR (Table 3-1) requires a test at the instrument level but not at the component level.

The pyroshock environment currently included in the AMSU-A component specifications is identical with that specified at the instrument mounting surface. This is a conservative flowdown of the shock requirements. Since the AMSU-A instruments have fundamental structural frequencies of approximately 100 Hz, the peak shock level of 1200 g's starting at 1150 Hz is significantly attenuated. In other words, the structure acts as a band-pass filter that minimizes transmission of high frequency energy.

The ideal solution would be to place accelerometers on the instrument and measure the transmission of shock to the components when the environment is applied at the module mounting interface. The measured shocks would then be inserted in the component specs, thus eliminating the risk of overtesting the components because of unknown structural attenuation. Unfortunately, this solution cannot be accomplished because 1) there are no EOS Engineering Models and 2) the instrument tests would occur long after the components would have been procured.

An alternate approach is to follow the PAR and not perform shock tests on the components. The risk is that shock-sensitive components may fail when the instruments are shock tested. However, the current shock curve appears to be representative of an environment that is relatively close to the pyro devices. High frequency shocks are attenuated rapidly as a function of the distance from the pyro device. Also, most components are mounted on thermal isolators which further mitigate the shock levels.

It is therefore felt that the risk of overtesting components in the currently-specified environment is higher than the risk of damaging components at the instrument level shock test. Accordingly, Aerojet will proceed to eliminate the pyroshock test requirements from the component specifications.

Weldon Chapman
Technical Director

Wayne Ely, Team Leader
Mechanical/Thermal Subsystem

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/27-11

ACTION REQESTED:

Flowdown to suppliers' requirement for N2 atmosphere during thermal cycling tests.

RESPONSE:

This action is being accomplished by modifying the thermal cycling test description, paragraph 4.6.3.2, of the environmental specification, AE-26578. This specification is referenced as part of each component procurement.

The following sentence will be added between the first and second sentences of paragraph 4.6.3.2 prior to awarding procurement contracts.

> The atmosphere within the chamber shall be dry nitrogen or other inert dry gas to protect the unit under test from condensation related damage.

Weldon Chapman, EOS/AMSU-A
Systems Engineering Product
Team Leader

8/27/94
Date

ACTION ITEM RESPONSE

ACTION ITEM NO. 7/27-12

ACTION REQUESTED:

Develop and maintain a list of differences between N/N' and EOS, e. g.., components, major active devices, etc.

RESPONSE:

A table indicating the differences is attached. The table will be modified and provided to the EOS Technical Officer as additional changes evolve.

Weldon Chapman, EOS/AMSU-A Systems Engineering Product Team Leader

8-4-94
Date

DIFFERENCES BETWEEN AMSU-A FOR EOS AND FOR N & N'

CHANGE TO EOS/AMSU-A	REASON FOR CHANGE/COMMENTS
MECHANICAL STRUCTURE AND THERMAL DESIGN	
Relocate A1 Mounting surface from side to base.	Requirement Change: EOS requires base mount.
Eliminate compensator in A2.	Disturbance torque requirement can be met without the compensator - in NOAA/AMSU it cannot.
Relocate optical alignment cubes near to base of A1 and A2.	Requirement in EOS GIRD that cubes be near base.
Thermal blanketing, mirror coverage on both A1 and A2 will (probably) differ	Modified to accommodate different orbit and spacecraft environment
DIGITAL PROCESSOR (A1 & A2)	
Replace Spacecraft Interface No. 1, Spacecraft Interface No. 2, and Parallel-to-Serial Converter CCAs with MIL-STD-1553B Bus Interface CCA.	Requirement Change: EOS requires MIL-STD-1553 interface instead of unique NOAA/AMSU interface.
¯hange instrument firmware.	Different spacecraft interface forces revision of a small percentage of code.
.NALOG PROCESSOR (A1 & A2)	
Design new engineering data multiplexer CCA to replace analog housekeeping and power relay CCAs	Requirements change: Engineering data must be on MIL-STD-1553 bus. Power relay CCA eliminated by combining functions on new CCA.
Change operating range of warmload temperature sensor conditioning circuits for A2 from 0°C - 20°C to 10°C - 30°C	Thermal analysis shows A2 to have different operational warmload temperature range in the EOS orbit.
SIGNAL PROCESSING (A1 & A2)	
Revise Signal Processing Assembly backplane wiring.	Driven by changes in spacecraft interface to a MIL-STD-1553 bus.
Eliminate upper card rack in A1.	Cost improvement permitted by reduction in CCA count due to new interface design.
POWER SUBSYSTEM (A1 & A2)	
Replace power relay assembly with new control/distribution module.	Requirements change: Power on/off not controlled by instrument as in NOAA/AMSU-A and redundant power bus is specified.

DIFFERENCES BETWEEN AMSU-A FOR EOS AND FOR N & N' (cont)

INTERCONNECTING HARNESS SUBSYSTEM (A1 & A2)	
Redesign main instrument harness so that it is in separate functional harnesses instead of one.	Harness redesign is necessary as a result of changing to the MIL-STD-1553 interface, changing the power interface, and adding the engineering data mux. Redesigned using separate harnesses to provide cost savings due to simpler and much faster harness/unit integration.
Add connectors to receiver shelves.	Compatibility with new harness design plus cost savings due to faster system integration.
Eliminate power distribution panels.	Not necessary due to harness redesign.
Change A1 card rack card guides so that slot J303 accepts a CCA instead of an I/O card.	I/O card count reduced from five to four in existing NOAA/AMSU-A. Empty I/O slot is now needed for active CCA.
Replace analog telemetry temperature sensors (type AD 590) with redundant platinum resistance transducers.	Requirements change to match spacecraft passive analog signal inputs.
Install two thermal switches in series for each survival heater.	Safety: Survival heater power is 'on' all the time on EOS/AMSU whereas in NOAA/AMSU-A it is switched. If a heater thermal switch sticks 'on', the other switch will still be able to shut off the power, avoiding the possibility of overheating.
Eliminate compensator motor driver CCA.	Compensator requirement eliminated.
Change number and assignment of instrument to spacecraft connectors.	Requirement driven; in new C&DH and power interfaces.

2

APPENDIX C

SYSTEM ENGINEERING

INTERNAL DESIGN REVIEW

SYSTEMS ENGINEERING INTERNAL DESIGN REVIEW

24 August 1994

A program of internal design reviews was begun this month, initiated with a system-level review. The review was well-attended, and included attendees from outside the program.

The following personnel attended. The functions/titles of those reviewers not directly attached to EOS/AMSU-A are provided.

Scott Armstrong, Aerojet Director of Sensor Products Engineering
Dennis Brest
Glen Crosby
Kala Crosby
Wayne Ely
Bob Hauerwaas, Technical Director of NOAA/AMSU-A
Sev Herrera
Glenn Martner
Al Nieto
Terry O'Brien, Aerojet Director of Systems Engineering
Prabodh Patel, NOAA/AMSU-A Systems Engineering Product Team Leader
Mark Pluck
Armando Valdez
Bob Newhouse, Aerojet Electronic Systems Manager

The presentation consisted of the following topics:

a. EOS/AMSU-A Science Objectives and Mission Concept
b. A System Overview - NOAA/AMSU-A vs EOS/AMSU-A
c. Requirements Verification Flowdown Approach
d. EOS/AMSU-A Systems Requirements as Imposed by GSFC
e. Radiometer Performance and Budget Allocations
f. EOS/AMSU-A System Concept
g. EOS/AMSU-A Requirements Flowdown
h. Environmental Requirements

Numerous points were raised which led to discussions and clarifications. Several other points were raised which resulted in issues which are still to be resolved. The following action items resulted:

1. A requirement imposed on NOAA/AMSU-A that beamwidth variations from channel to channel not vary by more than 10 percent total is not imposed on EOS/AMSU-A. A ±10 percent requirement instead is imposed. This is a change that was imposed on NOAA/AMSU-A via a NASA program directive that did not make its way into the EOS/AMSU-A specification. Scientifically, should it also be imposed on EOS/AMSU-A?

2. The elimination of the upper card rack in the A1 module has been challenged because of its structural and, to a larger extent, its thermal conductivity value. The cage may thus be retained but not used, incurring a

slight weight increase. Is there a reasonable alternative to retaining the card cage, or should it be retained as is?

3. The use of a 143-MHz crystal oscillator as a primary source for the phase-locked oscillator in A1 which is outside the PLO package has lead to concerns about EMI, specifically because the 143-MHz frequency is within most channel IF passbands. The existing oscillator is double shielded and up-converted to a frequency outside the IF passbands to avoid EMI. Although the new design has carefully considered EMI in its design, NOAA/AMSU-A systems engineering has voiced concern. Examine the EMI concerns, and the feasibility and value of repackaging the PLO oscillator into a common package.

4. The EOS/AMSU-A instrument requires thermal-vacuum testing at -30°C to meet PAR requirements. Concern has been voiced as to our ability to cool an instrument to that level in vacuum in current facilities. Investigate the concern, establish its validity and if necessary establish an alternate approach to meeting the requirement.

5. RF components are specified to operate between 10°C and 30°C (with a 10°margin on both sides). RF shelves are predicted to be between 10°C and 30° in orbit, whereas there are electrical isolators between the shelves and components which would make the components operate at a higher temperature. Should the component specifications be modified to match the different range?

Responsibilities and a schedule for action item completion are being established, and the action items will be reported at PDR.

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